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BULLETIN OF THE

TAYLOR SOCIETY

AN INTERNATIONAL SOCIETY TO PROMOTE THE SCIENCE AND THE ART OF ADMINISTRATION AND OF MANAGEMENT

SCIENTIFIC MANAGEMENT AND ECONOMIC PLANNING

The two papers included in this issue give a well-rounded picture of scientific management. Dr. Person's paper relates it to the broad social and economic problems of the day; Mr. Hathaway's ably describes one of its most important techniques.

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29 W. Thirty-Ninth St.
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DECEMBER, 1932 VOL. XVII, NO. 6

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Comment

IN THIS issue are published two complementary articles on Scientific management; one considering it from the point of view of the individual plant, the other from the social point of view; one emphasizing technique and the other philosophy. There is here shown, as one commentator has put it, "a sweep and perspective" not ordinarily shown in articles concerning the management of industry.

IT APPEARED to be the consensus of opinion at the December meeting that the call on Scientific Management to contribute its part in stabilization of industry involves an attack on two fronts: the stabilization of the operations of each component enterprise as well as the stabilization of industry in its collective aspects. The article by Col. Hathaway is the second of a series which considers how to go about the application of Scientific Management in the individual plant.

The paper presented by Dr. Person at the World Social Economic Congress held in Amsterdam in 1931 has not until recently been generally available because of the limited printing for use at the Congress. It has attracted considerable attention, and some consider it the most clarifying exposition of the general philosophy of Scientific Management which has been made. It is for that reason that the Directors of the Taylor Society have requested the author to secure permission for the present reprinting.

PARTICULARLY interesting, in view of economic conditions, is the concept that Scientific Management is not only a method of stabilizing any particular managerial situation, but is also a force which compels stabilization of ever larger areas in order to complete and maintain the stabilization of lesser areas. The individual machine cannot be completely stabilized until the shop is stabilized; neither shop nor machine can be completely stabilized until all production is stabilized; neither machine, shop nor all production can be stabilized until selling and general administration are stabilized; none of the above can be completely stabilized until the relations between plants and between industries have become stabilized. It is in this manner that Dr. Person develops the thesis that national planning is the logical outcome of first steps taken by Scientific Management in the individual workplace fifty years ago.

SANFORD E. THOMPSON, *President*

Scientific Management and Economic Planning[1]

A Philosophy and Technique of Progressive Industrial Stabilization

By H. S. PERSON

Managing Director, Taylor Society, New York

I. Past and Present

Introduction

IT IS our present purpose to examine scientific management as a means of industrial stabilization, and therefore as a means of social stabilization and progress. We shall discover that it is not only a means of stabilization, but also a force creating new situations which compel stabilization over ever wider areas of industrial relationship.

In current discussions of industrial problems in the United States the word stabilization is used with a frequency which is reflected by its use in this document. It is therefore essential at the outset to explain the meaning of the term when so employed, and incidentally in that connection to consider somewhat the nature of scientific management.

In American industrial usage the word stable does not imply a static condition such as, for instance, does its usage in chemical literature. Several centuries of experience in a dynamic frontier environment have made it impossible for the American to think in terms of unchanging social institutions. Therefore the word stable as applied to social concepts does not exclude the factor of change. It connotes adjustment and balance in the midst of change, absence of extreme fluctuations, the power to make change when it is desirable and to prevent it when undesirable, and some regulation of the direction and extent of change.

It is in this meaning of the term that scientific management is a great stabilizing force. Through application of its basic principle of research—discovery of laws governing mechanical forces, social forces and individual conduct—it on the one hand makes it possible to avoid unexpected change caused by unknown forces and on the other hand to promote desired change through controlled utilization of known forces. Through application of its principle of standardization—formulation of laws to guide conduct—it on the one hand avoids the wastes of chance variability in conduct by establishment of common understandings, and on the other hand promotes desired variation by specifications of new and better purposes, relationships, instruments and procedures. Through application of its principle of control—voluntary co-operation in accordance with standards—it constantly strives to guard accepted modes of conduct from change for which investigation has not found warrant, and to establish new modes of conduct which it is believed will promote accomplishment of a common purpose. The reader is referred to the following chart for a summary presentation of the principles of scientific management, the relation to them of the ever-expanding technology through which they are expressed, and the areas of functional industrial activity to which scientific management has been progressively applied.[2]

Scientific management is not only a means of stabilization; it is also a force which compels successive expansions of the area of stabilization. There are two reasons for this. First, in bringing any lesser area of industrial relationships under control, it is discovered that control over this lesser area cannot be complete until the environment affecting that area has been brought under a similar control; and second, the technology which establishes control in any particular area so affects relationships with and throughout the environing area as to intensify forces which tend to upset equilibrium. For instance: a workplace cannot be completely stabilized as long as the workplace preceding it in series delivers worked materials to it in an irregular flow; and on the other hand the stabilization of a workplace may produce an increased output which renders more unstable and uncontrolled the workplace following it in series. This makes it necessary, in order completely to stabilize any one of these workplaces, to bring the three into harmonious relationship.

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[1] Reprinted by permission from *World Social Economic Planning* ($2.50 with *Addendum*), edited by M. L. Fledderus, International Industrial Relations Institute, The Hague, Holland. This volume constitutes the proceedings of the World Social Economic Congress held in Amsterdam in August, 1931, and may be obtained in this country through the Department of Industrial Studies, Russell Sage Foundation, 130 E. 22nd St., New York. The preliminary studies which formed the basis for the Congress discussion may be obtained from the same source under the title, *International Unemployment* ($2.50). Only a few copies of these remain.

[2] The most comprehensive treatment of scientific management is *Scientific Management in American Industry*, published for the Taylor Society by Harper & Brothers, New York, 1929. See also *Frederick W. Taylor, Father of Scientific Management* by Frank Barkley Copley, Harper & Brothers, New York, 1923, and "Scientific Management" by H. S. Person, in the Proceedings of the Cambridge (England) Congress of International Industrial Relations Institute, 1928.

Thus scientific management, in order to complete and to conserve its achievement in any lesser area, is compelled to give attention to the environing area and to attempt to establish similar stability and control there. This necessity is progressive. Apparently there can be no end to it until the entire world of industry has been included. Fifty years ago scientific management began with the problem of the individual workplace, but to bring that under control it was compelled almost simultaneously to stabilize all related workplaces, i.e., the entire shop. Then to complete stability of the shop (production) it was compelled to attack the problem of merchandising and selling. Stabilization of the relations between production and selling demonstrated the necessity of stabilizing the function of co-ordination—general administration. So much for the individual enterprise, beyond which scientific management has not yet had noteworthy influence. Now, however, it is realized that complete stabilization of an individual enterprise as a thing in itself is not possible; that the entire industry of which it is a part must be stabilized—and probably all the industries of a nation in their relationships, and industrial and commercial relations internationally.

The scientific management of today is therefore a product of evolution. Although Frederick W. Taylor, the creative genius of scientific management, half a century ago gave us in embryo all that is contained in the far-reaching scientific management of 1931, it has been the subsequent efforts of many workers in fields not touched by Taylor, which have demonstrated its adaptability to varied and larger areas of management, brought it into panoramic perspective and proved it to be one of the durable and dynamic forces in the service of mankind. So fundamental are both its principles and technique, that although they had their origin and primary development in a highly individualistic and capitalistic society, they may serve equally well any other conceivable form of social organization. It is our purpose now to trace successive stages of its development as a stabilizing force.

Stabilization of the Individual Workplace

The first expositions of scientific management[3] were concerned with problems of the shop—the conversion of materials. They emphasized the discovery and control of physical forces embodied in materials, machinery, tools, appliances; methods and conditions of handling them; and the organization and direction of human effort closely related to their use. Although industrialists in the United States at that time—the last decades of the nineteenth century—were much concerned with the problem of management, they were giving their attention primarily to devising various incentive wage systems as a means of stimulating workers to increase production by greater personal exertion. Taylor and his associates made a new approach to the problem by insisting that the way to greater productivity was through stabilization and control of the processing, measurement of work, and rewards according to productivity. They insisted that the important thing is that work should be so organized that labor would automatically become more productive and wages higher, which could be realized only by bringing all the conditions of processing under control and eliminating the wastes of unco-ordinated efforts.

Why was there at that time absence of especial regard for phases of management other than conversion of materials and the human problems immediately involved; why disregard for merchandising and selling, general administration and the collective aspects of human relations? Because these latter were not at the time dominant interests in American industry. Taylor and his associates were practical men who made their appeal to dominant interests. The outstanding problem of the period was output of commodities to satisfy an apparently insatiable demand.[4] Anything which promised greater productivity at a given cost—an advantage

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[3] The early classics of scientific management are: "A Piece Rate System" by Frederick W. Taylor in *Transaction of the American Society of Mechanical Engineers,* Vol. XVI, (1895); "Shop Management" by Frederick W. Taylor in *Transactions A. S. M. E.,* Vol. XXIV, (1903), also Harper & Brothers, New York, 1911; *The Principles of Scientific Management* by Frederick W. Taylor, Harper & Brothers, New York, 1911; *Work, Wages and Profits* by Henry L. Gantt, The Engineering Magazine Company, New York, 1913; *Scientific Management* by C. Bertram Thompson, Harvard University Press, 1913, a collection of papers by various authorities which had appeared chiefly in periodicals during the preceding decade.

[4] One cannot really understand the scientific management of today without an understanding of its evolution, and one cannot understand its evolution without a knowledge of the background of industrial culture. For this reason we recommend Charles A. and Mary R. Beard, *The Rise of American Civilization,* one-volume edition, The Macmillan Company, New York, 1930.

Scientific Management in Perspective

As a Means of Achieving Progressive Stabilization

GENERAL PRINCIPLES	MAJOR ITEMS OF TECHNIQUE IN INDIVIDUAL ENTERPRISE		
	1. Work-Place	2. Shop	3. Personnel
RESEARCH in Its Various Forms Is the Approach to Solution of All Problems of Management.	Engineering Studies in design of equipment. Economic studies in size and output of machines. Methods study Time study Motion study Studies in behavior of materials Studies of skill	Studies of the relations of facilities and classes of skills available at the various work-places, and of the most effective co-ordination and proportioning of them under varying conditions of the kind and quantity of orders flowing into the shop.	Studies in mental and manual aptitudes Studies in personality requirements of various jobs Studies in emotional conditions and reactions Studies of group organizations
STANDARDIZATION Provides the Basis of Understanding Necessary to Co-operative Effort, Through Formulation of Purposes, Policies, Plans, Projects, Facilities, Methods, Conditions, Etc., Which Become Constant Factors in Planning and Execution.	Specifications of Materials Machines Tools and apparatus Product Unit times Methods Jobs Conditions Wage rates Quality Quantity	Specifications covering co-ordination, proportioning and application of skills and facilities under various specified conditions of the kinds and quantities of work. Production schedules	Specifications of personality requirements for various jobs Specifications relating to hiring, promotion and discharge Specifications relating to training and sharing of information Specifications relating to personal and group relations
CONTROL Is Effected by Co-operative Observance of the "Laws" Inherent in the Situation, Discovered by Research and Made Practical by Formulation in Terms of Standards.	Provision of materials and tools Specification of jobs or operations Inspection of product Inspection of performance	Functional separation of planning and execution Classification of operations Analysis of orders Routing; the analysis of the sequence of operations on a job Scheduling or assignment of operations to various work-places in accordance with routing Inspection: products, results, costs	Systematic intelligent direction of conduct in accordance with specifications indicated above
CO-OPERATION as a Mental Attitude Is a Condition of Efficient Common Effort, and as a Mode of Conduct Is the Result of the Formulation of Standards of Purpose, Facility, Method and Relationship.	As a condition and as a result, co-operation is promoted by the combination of all factors in the total situation: understanding and acceptance of the common purpose; instruction and the understanding of details; acceptance and performance of complementary responsibilities; proper		

The order from left to right indicates roughly: (1) chronological development: (2) application to expanding managerial areas.

MAJOR ITEMS OF TECHNIQUE IN INDIVIDUAL ENTERPRISE			COLLECTIVE ENTERPRISE
4. MARKETING	5. FINANCE	6. GEN. ADMINISTRATION	
Market analysis Quantitative Qualitative Studies of consumer demand Studies of the channels of distribution Studies in methods of selling Studies in sales promotion Studies of competition	Most of data required by this department are procured by other departments, e.g., costs Studies of market for capital Studies of customers' credits and collections Studies of prices of materials when purchasing is speculative instead of routine (e.g., cotton, rubber) Studies of financial ratios	Studies of the state and tendency of— Industry generally The particular industry The particular enterprise Industrial forecasting Studies of managerial operating ratios All researches of all departments contribute to the information required by general administration	Scientific management has not been applied to the stabilization of industry on national and international planes, although experiments pointing in that direction have been initiated. These experiments, however, are not free from simultaneous experimentation in other fields of social organization
Specifications Sales schedules Quotas: territorial commodity and personal Channels of distribution Methods of selling Prices Discounts Salaries and commissions	Specifications Standard costs Financial ratios	Specifications of Policy Projects Plans Master schedules Master budgets Operating ratios Ratios of relationship to the industry generally	
Functional separation of planning and execution	Inspection of financial aspects of management in terms of various ratios	Inspection of: Conformity of operations to budgets and schedules Special attention to exceptional situations Prompt decisions concerning changes in purpose and policy	

selection, assignment and promotion of personnel; provision of adequate facilities; just sharing of the joint economic rewards; humane personal relations; steady provision of work to be done.

in a competitive industry—was certain to command the attention of alert and progressive enterprises. Even the emphasis on processing which Taylor made in his expositions—so far-reaching were his technique and his philosophy—caused him to be characterized as "twenty years ahead of his time." Had he then made the various additional emphases which have been made since his day, industry would have ignored him completely as a visionary crusader.

Both logically and practically the limited approach was right. Control of material facilities through knowledge of their characteristics and best methods of their use in that period of conquest of natural forces was the starting point of good management, whether considered from the point of view of individual competitive advantage or of social economy. With that as a base other elements could be permanently reared upon it as a superstructure. Without that base the increments could make only an unstable structure. Early scientific management was right, furthermore, in its insistence that scientific method in the managerial control of material facilities is basically identical with the scientific method in the control of other factors.

There was a deliberate decision to concentrate on a thorough demonstration of scientific management in the field of production and leave to later students the application to other phases of management when new conditions should have increased the relative importance of those phases.

Taylor brought inductive science to bear upon the problem of managing each and every workplace in the shop.[5] Nothing was too minute for painstaking experiments to discover the perfect form of machine, tool or appliance and the perfect method of their use. "Perfect" mechanism or method meant one most economical of the energy of the worker. In the case of machines and tools the capital charges were also taken into consideration. Economy of energy was indicated by increase of output per unit of time without fatigue of the worker, and economy instead of prodigality of energy was safeguarded by a planning of work which took into consideration standard maxima of output per unit of time.

The most suitable materials, machines, tools, appliances, mechanisms, or methods for each workplace and kind of work having been determined by investigation and experiment, the next stage in stabilization of conditions at the workplace was to standardize the best methods of using these. This involved really four steps: first, common understanding of the best tools and methods through publication in standing and special orders, instruction cards and so on; second, promotion and maintenance of understanding through specialized instruction of workers; third, maintenance of standards through specialized inspection and maintenance; and fourth, planning and routing of operations, including preparation and assembly of materials, tools and instructions for each operation. Typical activities involved in standardizing operations of a unit workplace are indicated in the first column of the preceding chart, in which conditions, mechanisms and governing principles are brought into relationship. The net result of stabilization in this manner of the relations of material and human factors at the unit workplace was an increased productivity of the workplace per unit of time, and per unit of machine and labor energy; and therefore reduced unit costs. Reduction of unit cost proved to be the practical and powerful appeal to the interests of industrialists in an active competitive era.

In this establishment of harmony and balance of factors at the unit workplace was discovered the basic principles of scientific management — see preceding chart—which were to have so profound an influence on American industry when eventually applied also in other phases of management. Also in this process of bringing individual workplaces under control it was simultaneously perceived that the immediate environment of workplace relationships must be brought under a similar control in order to perfect and preserve the control at any individual workplace.

Stabilization of the Shop

The stabilization of one workplace after another, even without consideration of their relations, establishes a certain degree of control of the shop as a collection of workplaces. There still remains, however, the problem of co-ordinating the relations between workplaces in order to secure the most effective control of each workplace and of the shop. This indicates that scientific management includes within itself a compulsion to stabilize ever-widening areas of industrial relationship. The forces bearing upon stability of the unit workplace do not all originate within the workplace itself; no matter how completely and how perfectly control is effected at the unit workplace, it is discovered that forces which have their origin in the environment of the workplace impinge upon it and upset the stabilization effected locally. For instance, in a series of unit workplaces in which workplace Z receives partly worked material from workplace Y, no matter how well Z is stabilized locally, it cannot be completely stabilized if Y is not stabilized and if it makes its contributions to Z in a fluctuating manner. To complete the stabilization of Z, Y also must be stabilized—and X, W, V, etc., in an ever-widening environment.[8] Therefore stabilization of the shop is not merely the incidental sum of the stabilization of all unit workplaces considered as unrelated units; stabilization of all related units is a part of the problem of stabilization of each individual unit. We have impressed upon us here the fact that each unit workplace is but a member of a larger organic whole and that all of them are inter-related and interdependent.

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[5] Cf. Robert Bruere in *Scientific Management in American Industry, op. cit.,* Ch. XXIX.

It is this factor in stabilization which has compelled scientific management continually to widen the area of its concern. Stabilization of material factors is not sufficient; human relations must be stabilized. Stabilization of production is not sufficient; merchandising must be stabilized. Stabilization of production and merchandising is not sufficient; general administration must be stabilized. Stabilization of an individual enterprise is not sufficient; all enterprises in the industry must be stabilized. Stabilization of one industry is not sufficient; all industries of a nation must be stabilized. And it is the thesis of this Congress that stabilization of national industry alone is not sufficient; international economics must be stabilized. Achievement of any of these ends is a step toward a more balanced and harmonious industrial and social world life; each end is but a means to another and greater.

The principles and most of the technique pertinent to stabilization of the shop are identical with those pertinent to standardization of an individual workplace. Early scientific management did its work in the first unit area so thoroughly that it discovered the principles and devised and assembled the parts of an integrated technique for stabilization of any area of purposive effort, whatever its nature and size. Whatever the area, research as a principle and as a method remains constant and basic, although things to be investigated may be different. Standardization remains a constant, although the elements standardized may vary. Control through knowledge remains a constant, although the laws which constitute the control vary with the factors to be controlled. Co-operation remains a constant, although the division of efforts and the complementary things to be done reflect the difference in factors and their relationships.

This is apparent to one possessed of the imagination to visualize the shop or industrial establishment as one huge machine. The research problem to determine the most suitable kind of tools and methods at the individual workplace becomes for the shop a problem of most suitable machines, tools and methods in relationship. The problem of gearing the separate tools into a machine representing a unit workplace has become the problem of relative sizes and capacities of many supplementary machines. The problem of the best place to locate material to be worked on at the individual workplace has become for the shop the problem of providing raw materials and moving and storing those in process. The problem of the capacity of the machine has become the problem of the capacity of the shop. The problem of simplifying and standardizing the material for a given product of a unit workplace has become in the shop the problem of simplifying and securing the maximum adaptability of the least possible variety of materials. The problem of the most suitable particular kind of skill for the unit workplace has become the problem of the most serviceable ratios of various classes of skills throughout the entire shop. The problem of the ratio of idle time to productive time at the individual workplace has become the problem for the shop of the idle and productive times of tools and machines in the aggregate. And so on. Most problems of the individual workplace can be matched by problems, more complicated but essentially identical, in the shop conceived as one huge machine. For the shop the methods of research become more complicated and the resultant standards more varied, but the principles and the structures of research, standardization, control and co-operation remain the same.

Some of these principles—and other aspects of scientific management—are not commonly understood and should be considered further.

The term research identifies the principle that judgments and decisions should be based on ascertained facts and not on impulse or guess. Scientific management demands this attitude of mind on the part of all co-operators and toward all problems, small as well as large. It does not, however, insist that all problems require the same technique or degree of fact-finding. It may use the historical, statistical, experimental or other method according to the nature of the problem. In one instance exhaustive experiments may be made and in another a few samples examined, according to the importance and urgency of the problem. Scientific management seeks data for use in planning action; if the action is to extend far into the future and affect many individuals, the search for data will be exhaustive; if the action is transitory and affects few individuals the investigation will be modified accordingly. In this connection it may be said that scientific management insists on three things: always the mental attitude which demands the pertinent facts before making a judgment; as many of the pertinent facts as the nature and duration of the use justifies, when judged by the cost and time required for finding them; and facts of such a nature that their significance can be formulated into understandable specifications of action.

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[8] It is obvious, of course, that workplace Z should not be stabilized first; A should be stabilized first, then B, then C, etc., and Z should be stabilized last. The exception to this principle is that purely local stabilization may be developed at all workplaces simultaneously. Mr. Kent (*op. cit.*) has informed the author that Taylor shortly before his death recommended the following order of attack on the problem of stabilizing the shop: (1) stores; (2) materials; (3) tools; (4) machines; (5) methods; (6) rates.

Standardization means simply the publication of the results of research in the form of specifications which serve as a guide to action. Inasmuch as research should be continuous and continuously fruitful of new knowledge, standardization does not imply a static situation but regulated change. The rates, increments and times of change are themselves subject to determination by research involving primarily the balancing of the costs of change—not measured only in money—against the value of change. A close-up cross section of a scientific management situation should disclose an apparent static relationship of co-ordinated "bests in the present state of the art." But a scientific management situation in perspective over a period should disclose predetermined and regulated change in these "bests" and their relationships—a moving equilibrium of internal readjustments like that of a ship at sea.

If there were more of genuine standardization of this sort, including particularly standardization of the methods and rate of standardization, what is called technological unemployment would tend to be reduced to that caused by periodic basic and revolutionary discoveries and inventions, and thus brought to a humanly irreducible minimum. Technological unemployment appears to be caused generally by periodic sudden adaptations and utilizations, stimulated by changes in economic conditions, of well-known rather than new basic discoveries and inventions. Most enterprises follow the line of least resistance and manage to get along with equipment and methods which gradually become too obsolete to be operated in the face of the competition of new progressive plants. This situation forces periodic sudden widespread and radical technical changes. Technologically too many employes are released at one time to be reabsorbed economically. But in a plant in which research, standardization and restandardization are continuous, technological improvement can be introduced by such small increments that employes may be adjusted and reabsorbed. Under such circumstances the older workers, with their accumulated fund of skill and understanding, become an asset instead of a liability.

Control in scientific management means exactly the opposite to what it means under the ordinary form of management. In the latter instance it means arbitrary power over—"authority" and individually determined "orders." In scientific management, to accomplish a given purpose the laws of the situation specified in the standards must be commonly observed; i.e., each co-operator must perform his function in the manner, at the time, to the degree and in the relationship prescribed by the research-discovered best system of joint effort to accomplish the common purpose. "Responsibility" replaces "authority." Executives as well as workers are subject to the laws of their responsibility. Instead of one looking to another for an "order," one looks to another for performing his responsibility.

For an analogy common to the experience of all nations represented in this Congress, perhaps the management of an orchestra will best serve our purpose. The score constitutes the standards. The various choirs of the orchestra correspond to the classes of work in the shop. The conductor and the concert-master are the executives and the individual musicians are the workers. All are bound by the laws written in the score. The leader wields a baton, and each signal of the baton is an "order" in a very special sense. But it is not an order representative of an individual's guess or whim. It is a signal which is determined by a law of the score to which the leader is bound as much as each performer is bound by his particular set of notes. If the leader is incompetent or lawless, confusion results, there is no common achievement and he is separated from his responsibility. Each performer knows in advance what the order is to be. He is competent to judge whether it is properly given. He knows instantly whether an impulse of the leader has violated the written law. All are subjects of a code constructed to accomplish the common purpose smoothly and economically. And yet there is opportunity within the law for a genius like Toscanini to manifest his particular qualities of leadership, and for an individual player to manifest his skill with an instrument. Likewise in scientific management there is within the law opportunity for leadership and individual craftsmanship.

The meaning of co-operation has been indicated by what has been said about standardization and control. If control is not dependent upon authority and force it must be dependent upon co-operation. Control is established by common understanding of purpose and of individual responsibilities and their relations, and by the will to work together. Control in scientific management implies co-operation—and of the individually detonated, enthusiastic type. It is for this reason that the establishment of scientific management is a problem of education, of understanding and practice, for which time is required. It is not a complex group of mechanisms which may be bought or imitated, and installed in a short time.

Insofar as establishment and observance of a code of co-operation constitute mechanization, scientific management is mechanistic. It constitutes mechanization of the same sort as playing a game according to the rules of the game, or in any situation performing complementary functions according to the requirements of the functions. In many discussions of the subject, however, there appears to be the assumption that scientific management is mechanistic by requiring the substitution of mechanical for human energy; that scientific management is achieved to the same degree, and the same degree only, that machine energies are substituted for human energies. No assumption could be more erroneous. Scientific management in any particular situation starts with no preconceptions concerning mechanization. Its research may lead to the substitution of machine for manual labor, improvement of an existing machine, substitution of a new for an obsolete machine, or a larger for a smaller machine, or a smaller for a larger. Its research may in some instances lead to the elimination of a machine as uneconomic, and the substitution therefor of human energy. In other instances it might lead to the elimination of an operation and the purchase of the product of that operation in the open market, in which case mechanization in the industry is reduced by the avoidance of duplication of facilities among plants. Scientific management research includes within its scope, and in fact begins with, inquiry into the economics and sociology of the situation, and does not proceed to mechanical engineering until sociological and economic facts have been determined and mechanical and industrial engineering requirements derived therefrom.

In extreme cases of mechanization, e.g., mass-production plants having continuous processing on automatic and quasi-automatic single-purpose machines, scientific management of the details of processing, so essential in smaller plants utilizing multiple-purpose machines, tends to disappear because management of details itself tends to disappear. In these cases the researches of industrial as well as mechanical engineering are focused on the designing of the equipment. Co-ordination between parts of a machine and between machines is designed into the machines themselves and into the auxiliary conveying apparatus. The human contribution in processing becomes restricted chiefly to maintenance of the equipment and the manipulation of valves and levers. Speaking broadly, machines determine the actions of the men instead of men determining the actions of machines. Therefore there is little need of scientific management of variations in processing. An extreme case is a plant in Milwaukee, Wis., which produces 10,000 automobile chassis frames per day, 3,000,000 per year, with a scant 200 workers of whom only 50 touch the product. There is, however, a supplementary organization of 1,000 research engineers. Such plants as these are called into being by mass markets which make continuous processing economical on costly single-purpose machines; they are not a consequence of scientific management *per se*.

Let us leave this point with the general statement that scientific management does not presume increased mechanization; that in any particular instance it may increase it or reduce it; and that where mechanized mass-production exists, scientific management may or may not be present.

Stabilization of the Human Factor

In marked contrast to the later literature of the subject, the early literature of scientific management did not place strong emphasis on human relations as a factor in management. Yet in practice such relations received significant attention from the beginning.

This absence of emphasis in the early literature was due to the circumstances of the time, general and particular. In particular that literature did not consist of exhaustive treatises for a general public of varied interests, but was the record of occasional addresses to special audiences of engineers and executives. These addresses were an effort to win acceptance by owner-managers, the group then having sole administrative responsibility for organization in industry, of the new concept and technique of scientific management by appeal to their dominant interest in the immediate and practical problem of high productivity at low cost. These addresses therefore emphasized means in detail and ends only in general; ends such as low labor costs, high wages, sympathetic understanding between management and workers, and industrial prosperity;[7] means such as research, standardization, functional organization, functional supervision, time and motion study, planning, predetermined tasks and differential rewards. The social point of view in these addresses was that if means were accepted the ends would be realized as a matter of course. Therefore the emphasis on these arguments was on means.

In general the industrial culture of the time[8] was one in which managements were interested primarily in productivity. It was a virile industry in which proletarianism was not yet conspicuous; an industry of splendid personal generosity and helpfulness in times of stress, but without much institutionalized humanitarianism. Such concepts as "welfare work," "personnel management," and "industrial relations" were not yet prevalent. It was a period of industrial surge which continued the revolution that had been dramatized in the war between the States (1860-1865) and had firmly established capitalistic industry behind bulwarks of favorable banking, tariff and immigration legislation.[9] The commodity theory of labor was a logical doctrine of the time. Notwithstanding occasional panics and depressions it was a period of that intense activity now called a "seller's market." Therefore generally the problem of management was one of production; high production and low labor costs were the dominant interests. The early expounders of scientific management knew their industry and appealed to these dominant interests. Yet in practice, as we have said, from the moment scientific management gave attention to the stabilization of the workplace and shop the problem of personal relations also received special attention. This attention has increased as the years have passed and new problems come to the fore, and now gives scientific management a commanding position in the world campaign for improved human relations in industry.

There were two reasons for immediate practical attention to this phase of the stabilization problem. First, technically it was perceived that the relations of men to tools, machines, management and each other were an integral part of the management problem at the workplace and throughout the shop, and that stabilization of facilities could not be separated from stabilization of the relations between them and the users; second, philosophically and ethically scientific management had its origin in a specific ambition of Taylor's to better human relations in industry.

It had its origin in a problem of human relations when Taylor as a young, inexperienced foreman encountered his first and last controversy with workers under his supervision. This experience distressed him; "The life was a miserable one, and I made up my mind to either get out of the business. . . or to find some remedy for this unbearable condition."[10] The remedy, he decided after giving thought to the matter, was knowledge, facts laid on the table for all to see, instead of guess and whim and autocratic force. The way to knowledge, he decided also, was through investigation and experiment. In this way scientific management—inductive science in management—had its small beginnings exactly fifty years ago.

Although he did not emphasize it in his early expositions—explanation of the end would have been so far in advance of the time as to have generated sales resistance to acceptance of the means—this objective inspired Taylor from the beginning. It has continued to inspire the whole scientific management movement. The following is a fairly accurate ranking of the interests of Taylor and his successors, each item conceived roughly as contributing to those which precede it in the list: human welfare; harmony in industrial relations; an equitable division of the social income in fair profits, high wages and low prices; high productivity; perfection in management; science in management. In the early addresses, however, notwithstanding an especial interest in those items which are primarily ends, for reasons which we have already explained, emphasis was placed on those which are primarily means.

The attack by organized labor upon the scientific management concept in 1910-11, and for a few years following, may now be dismissed as inconsequential. It did not arise out of any unfavorable reaction of workers in scientific management plants. It was *a priori*, speculative, doctrinaire disputation which arose out of failure to understand scientific management as a doctrine. This must be charged in large part to the omission of emphasis on ends in the early literature. Several years of this disputation, characterized by a smoke-screen of nebulous assertions, was succeeded by revealing experience with scientific management in war-time production; and by the end of the World War better understanding of the objectives as well as the details of scientific management led to passive, and in some instances active acceptance by organized labor.

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[7] Taylor, Frederick W., "A Piece Rate System," *op. cit., passim* and *Shop Management, op. cit., passim.*
Gantt, Henry L., *Work, Wages and Profits, op. cit., passim.*

[8] 1885-1900.

[9] Beard, Charles A. and Mary R., *The Rise of American Civilization, op. cit.,* Ch. XVII.

[10] Copley, Frank B., *Frederick W. Taylor, Father of Scientific Management, op. cit.,* Vol. 1, pp. 4-6, 157-189, also Person, H. S., "Scientific Management," *op. cit.*

Technically the problem of stabilizing human relations in American industry in the early days of scientific management was much simpler than it is today. The emotional nature of man did not occupy so large an area of the problem, and group emotions especially were not yet an important factor. Even such individual emotions of men as are today presented in the feeling of industrial insecurity did not play a large part. The workers, like the employers, felt reasonably secure and were interested primarily in raising their standard of living. They wanted employment—which was usually to be had—and high wages, for these made possible "the full dinner pail," a favorite expression of the time. They wanted good working conditions, but this was not emphasized, for "conditions" are relative, and working conditions as they found them were less disagreeable than those of the woods and farms from which the native workers had come, or the European industrial cities from which the foreign-born had emigrated. To immigrants of that day America was the "land of prosperity and opportunity." Therefore the problem of human relations centered about increase in the standard of living as a fulfillment of this promise of opportunity and prosperity.

Scientific management at first made its immediate objective a recognition of this common motivation. "High wages and low labor costs" was an appeal[11] to the same dominant emotional interest in workers and owners. Productivity became the first and fundamental problem of human relations. This was possible for an enterprise in competitive industry only if there were greater productivity per unit of human energy and of capital investment, which in turn was possible only by discovery of better facilities and methods, and making these effective in a stabilized system of cooperative effort.

The first step in development of the technique of scientific management was "job analysis," although this term had not been devised. These early job analyses differed from those of modern personnel managers in a very important respect: instead of being analyses of jobs as they are ordinarily performed, they began with experiments to determine the best facilities and methods for a job, and then followed analysis and standardization of these perfected methods.

These early analyses were studies of machines in use, and were therefore studies of operators and their methods as well as machines and their tools. The human factor stood out at once as of primary importance. To establish the most perfect conditions in their totality at a workplace it was perceived that it was necessary to select workers for particular jobs according to their native capacities and acquired skills, train them, inform them concerning the detailed requirements of each operation and the relations of operations, and win and maintain their sympathetic interest and good-will. Thus simultaneously with attack on the problem of stabilization of the workplace through perfection of equipment, scientific management, because of inherent principles, was compelled to give attention to the total situation, involving men as well as equipment.

The practical outcome of these early studies was that then, for the first time in American industry, began systematic care in the selection of workers—such as keen, intelligent men for skilled machine work and strong, lethargic men for monotonous shoveling and lifting. Then began systematic training through especially selected and functionalized foremen; the giving to workers of complete information through written instructions in place of abrupt commands; and special assistance to workers through provision of the necessary perfectly conditioned tools for each job. Investigations of fatigue were made which rank with those of modern psychology, and working conditions were defined accordingly. A systematic relationship and procedure was devised which insured competence, understanding and the necessary facilities. The result was increased productivity, higher earnings, lower costs. The full dinner pail of the worker was made fuller, and the profits of the enterprisers were increased. Thus were co-operation and good-will established. To provide against occasional irritations and conflicts through misunderstanding, and for the settlement of disputes promptly at their source, the pioneer functionalized personnel manager, although not so called, was created and made a permanent part of the organization. All of this was nearly a half century ago.

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[11] Taylor, Frederick W., "A Piece Rate System," *op. cit.* p. 12; Taylor, Frederick W., *Shop Management*, *op. cit.* p. 22.

These remained the focal points of early scientific management's interest in human relations so long as the general conditions of industry remained those of a vigorous, expanding sellers' market. In the course of time, however, significant changes appeared in the general conditions of industry, which scientific management anticipated by continual expansion of its basic technique.

It is impossible to understand this evolution of attitude toward the human problem in American management without understanding social and industrial history. The days of early scientific management had one philosophy of personal relations; our day has another. The social philosophy of those early days was that of frontier individualism with emphasis on self-reliance, intuition and responsibility. On the whole it served reasonably well, for if an individual failed to adjust to one particular opportunity an abundance of others was available—new industries were springing up on every hand and there were still free lands to be had almost for the asking. Under these conditions the attitude of early scientific management toward the personnel problem, as indicated above, was a radical departure from that which was prevalent and was a step toward that held by our generation.

The attitude of our day has been determined by a new perception of inter-relationships and interdependencies created by the new commercial and industrial technology, of which scientific management itself is a major factor, and by the new spirit of "humanism" generated by the more widespread higher education, pragmatic philosophy, institutional economics, sociology, the social sciences generally and other forces. The older attitude was still dominant when Taylor retired from active affairs, and, therefore, the burden of interpreting scientific management in terms of the new dominant interests fell to his successors. How well they have done their work in the second quarter century of scientific management is indicated by the fact that plants which it has influenced constitute today the outstanding cases of progressive industrial relations; scientific management literature is the record of the progress of humanistic as well as efficient management, and its organizations offer the only forums specializing in management on which problems of human relations in industry are discussed openly and impartially. The code of employer-employe relations, which this Congress honors by selection for consideration at one of its sessions, is a creation of scientific management and is the only such code yet formulated by any group in America. Organized labor and scientific management technicians are today jointly further developing the technique of scientific management as the fundamental and substantial institution for establishing stability and harmonious relations in industry.[12]

The classics of scientific management, now familiar through translations to nearly all the world, were written before this recent intensive interest in human relations generated by the new commercial and industrial technology.[13] For evidence of scientific management's later interest in the problem one must consult later records.

The first of these sources is the little-known statement by Taylor himself, in January 1912, more than ten years after his retirement from professional work, at a hearing before a Special Committee of the House of Representatives of the Congress of the United States.[14] This Committee was created especially to inquire into the human relations aspect of scientific management.

This testimony made clear the fact that scientific management had never been inspired by any desire to establish a new social order, but to make human relations harmonious in industry as it is today—individualistic, capitalistic, with specialization and division of labor. This harmony is to be established by an intellectual revolution on the part of both employers and workers concerning their common purpose and the means of achieving it. The purpose is greater leisure and culture for workers as well as employers through greater prosperity resulting from greater productivity. The means to this greater productivity is discovery by research of "a science" for every operation and every relation between operations in co-operative activity, and the formulation of the discovered laws into rules of co-operative procedure. The organized investigations for discovery of the laws governing the joint activities should be participated in by workers, and the resultant procedures should govern owners as well as workers. The co-operation must be voluntary —not imposed by one party on another—and could if necessary be promoted by collective organizations. The achievement of voluntary co-operative activity is a matter of education and understanding. The mechanisms of scientific management should not be confused with the principles. The latter are enduring; the former, expressions of the principles, may vary from place to place and change with changing conditions of the application of the principles. Therefore scientific management is not something which may be imitated or bought outright, or imposed by one party on another, but is a process of co-operative education in learning how to achieve ever greater productivity and ultimately greater leisure and culture.

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[12] "The Naumkeag Experiment," *Bulletin of the Taylor Society*, Vol. XV, No. 2, April, 1930, pp. 63-79.

[13] It should be noted that *The Principles of Scientific Management* (1911) which might at first be considered an exception to this generalization, is essentially a popular restatement of the contents of *Shop Management* (1903).

[14] The official report has been long out of print, but Taylor's testimony was reprinted in *Bulletin of the Taylor Society*, Vol. XI, Nos. 3 and 4, June-August, 1926. This also is now out of print but fortunately can be found in many public libraries.

It is regrettable that this illuminating statement by Taylor has not been known throughout the world; and even more that there was not forty years ago such a general interest in industrial relations as to call it out.

Since its utterance in 1912, however, the literature of scientific management has been one of industrial relations as much as of managerial technology. It has introduced to industry the doctrines of workers' consent and participation,[15] and of utilization of workers' capacity for creative self-expression.[16] In 1916 Robert B. Wolf observed: "The management should primarily furnish the men with the information necessary for them intelligently to co-operate in determining what the standard practice should be . . . and my personal opinion is that the splendid results obtained by Dr. Taylor . . . were due largely to the fact that he stimulated the reasoning powers of the men . . . and made them realize that they were co-operating in obtaining the results."[17]

During the past decade scientific management has again made inquiry into the nature of authority and who are managers. Henry S. Dennison says:[18] "We must find ourselves forced to answer that while the managing factor is heavily graduated from almost zero to almost 100 per cent among separate individuals, it nevertheless finds itself to all practical purposes coterminus with the whole active organization." And from Miss Mary Follett, now a resident in London: "If, then, authority is derived from function, it has little to do with hierarchy or position as such, and in scientific management shops this is more and more recognized . . . Authority should go with knowledge and experience . . . that is where obedience is due, no matter whether it is up the line or down the line."[19]

Ten years earlier this emphasis in scientific management had been anticipated by Morris L. Cooke, a co-worker with Taylor. "Should we not learn in every relation in life to follow the lead of the particular individual who is charged with any given function, whether he be the President of the United States, the traffic officer, or the clerk in the office?"[20]

In his presidential address before the Taylor Society in December 1928, Mr. Cooke considered at length the possibility of a recognized functional status for workers' organizations. "If it can be accomplished the group of workers must be collectively related to industry in a way not possible under a bargaining status. What we want now is an integrating process which will tend more and more to unite us in a common purpose. The development of the techniques by which such unity may be accomplished is a problem common to all productive enterprise . . ."[21] At the present moment scientific management is being developed in a cotton plant in Massachusetts by an engineer employed jointly by the management and the local unit of the national union of the workers.[22]

We perceive, therefore, that the necessity for taking into consideration all factors in a management situation has given scientific management a vital concern for industrial relations from its beginning. The forms of its concern at any time have reflected the general mental attitudes and industrial conditions of the time; or to be more accurate, the new mental attitudes and industrial conditions imminent at the time. Fifty years ago its concern was manifest in such details of personal relationship as were presented by problems of ability, skill, training, temperament and fatigue in relation to the job; today it is manifest also in such broad problems of collective relationship as provision for a functional status of workers' organizations in industry.

A noteworthy characteristic of this progressive leadership of scientific management toward sound human relations in industry is its freedom from sentimental and academic direction. It has been under the guidance generally of men and women in direct contact with industry. It has never departed from the basic principle that the focal points of industrial relations are the unit workplaces. In these vital spots lies the problem "of getting the work done with the utmost excellence it admits of." In them frictions arise and states of mind are generated and there the remedies must be found. The problem of stabilizing relations between men and things and between men and men is an inseparable part of the problem of technological stability.

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[15] Valentine, Robert G., in *Bulletin of the Taylor Society*, Vol. II, No. 1, June, 1916, p. 7.

[16] Wolf, Robert B., in *Bulletin of the Taylor Society*, Vol. I, No. 3, May, 1915, p. 1; Vol. I. No. 4, August, 1915, p. 2; Vol. II, No. 1, January, 1915, p. 3.

[17] *Ibid*, Vol. II, No. 3, June, 1916, pp. 7-8.

[18] *Ibid*, Vol. IV, No. 3, June, 1924, p. 106.

[19] *Ibid*, Vol. XI, No. 5, December, 1926, p. 243.

[20] *Ibid*, Vol. III, No. 4, August, 1917, p. 7.

[21] *Ibid*, Vol. XIV, No. 1, February, 1929, pp. 5-6.

[22] *Ibid*, Vol. XV, No. 2, April, 1930.

Stabilization of Marketing

Following the World War one of the most disturbing changes in American industry was the sudden transition from a sellers' to a buyers' market. Industry before the war had enjoyed a gradually expanding consumption and rising prices, and production to satisfy this increasing demand had been the dominant interest. Considering industry as a whole marketing relatively had not been a problem. Then in 1920 came a change, indicated by a sudden turn in the price curve. Industry found itself on a buyers' market and intensive selling became a necessity and a problem.[23] Selling then became the dominant interest. Scientific management recognized the new problem and added to its other educational interests that of more scientific management in marketing.[24] This was not the earliest evidence, however, of the influence on selling of scientific management principles and technique. As early as 1912 Charles W. Hoyt had opened his "Scientific Sales Management"[25] with a chapter which reviewed Taylor's work and the principles of scientific management in production, and had then attempted to adapt these principles to the problem of sales management. But at that date, because selling was not the dominant interest, the new approach in this book attracted little attention. It required the sudden appearance of the buyers' market of 1920 to focus attention on the problem of marketing. By 1930 the literature of scientific management applied to selling—and also to the office, that auxiliary unit which intensive merchandising had helped to make prominent and costly—had become substantial.[26]

Scientific management's pioneering emphasis on scientific marketing was forced by the logic of the situation. It was another example of the necessity to stabilize a larger managerial situation in order to preserve the stabilization of a lesser one. As long as the flow of orders into the processing departments of enterprises had been relatively regular, scientific management had given its primary attention to perfection of its methods in production. As soon as the flow of orders into manufacturing departments became irregular and seriously declined, the stability of every production situation was upset. Scientific management was compelled to protect the stability it had accomplished in that field by attacking the additional problem of sales management imposed by the unstable environing market.

The problem of scientific marketing for the individual competitive enterprise was one of applying formulated principles and basic elements of an established technique to a new field. The studies and experiments in merchandising during the decade since 1920 have discovered no alternative principles and no technique different in basic characteristics. Market research is in principle the earlier production research applied in another area to another set of similar problems. The establishment, for instance, of sales quotas, by items, territories or salesmen, is a procedure in standardization similar to the setting of definite tasks for machine or bench work. Sales programs and schedules correspond to production programs and schedules. The establishment, after adequate research and experiment, of new channels of distribution is analogous to the regularization of the flow of work in the shop. The study of the use and style values of items, and the adoption of new and the elimination of old items and styles, is the production problem of design, materials and machining expressed in other terms. The routing of salesmen corresponds to the routing of work in process. The problem of warehousing is the plant problem of storage on another scale. The control of merchandising inventories is the technique of materials control projected into the area of distribution. "Hand-to-mouth" merchandising is made possible by broader application of the same technique that is expressed in the balance-of-stores ledgers and materials control in the shop. Accounting for the costs of sales is essentially the same technique as accounting for the costs in production. Even the principle of separation of planning and execution is found in the separation of the function of devising sales programs and methods from the function of directing the sales force in carrying out the programs. Notwithstanding a greater number of imponderables which evade control and complicate the problem, all along the line of major functions in current scientific marketing—from market research at one extreme to standard methods of suasion and securing orders at the other extreme—the principles and technique of scientific management of the shop are reproduced. At last the practical industrialist is discovering by experience, what the economist has consistently asserted, that manufacturing and selling are socially but parts of a continuous series of inter-related processes, all of which are essential to the production of utilities and subject to the same principles and basic elements of management.

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[23] We should not be misled by the spectacular activity and growth of the automotive, radio, tobacco and a few other industries during the decade 1920-1929. Many of the older staple industries such as the woolen, cotton and shoe industries were suffering severe depression. On the whole, American industry had its first experience with a prolonged buyers' market.

[24] "A widespread interest in marketing methods cannot be said to have come with the turn of prices, although at that time there was plenty of talk about the difficulty of getting sales. As early as October, 1920, however, articles suggesting a more scientific viewpoint on marketing appeared in the Taylor Society Bulletin." *Report of the Committee on Recent Economic Changes of the President's Conference on Unemployment*, Herbert Hoover, Chairman, New York, McGraw-Hill Book Company, 1929. Vol. II, p. 531.

[25] New York, George B. Woolson & Company, 1912.

[26] For example: White, Percival, *Scientific Marketing Management*, New York, Harper & Brothers, 1927; and Leffingwell, William H., *Office Management: Principles and Practice*, Chicago, A. W. Shaw Company, 1926.

The problem of marketing is infinitely more complicated than is indicated by this over-simplified consideration of it. The progress of goods from producers to consumers is halted and diverted continually by the interference of forces beyond the influence of individual managements. The marketing problem of enterprisers in a competitive industry is but part of the larger problem of stabilization of the relations between total consumption and total production of a society, with all its train of factors such as competition, purchasing power and credit. This raises the inevitable problem of stabilization of national industry, which will be considered later. All that scientific management has been able to do in marketing is to make a beginning with respect to the few factors on which an individual management can have direct and immediate influence. This is indeed a small sector of the problem. What is being done is both complicating the larger problem and giving experience vital to its solution.

Let us leave this brief section of our exposition with the emphatic reminder that this effort to develop scientific marketing is but an additional step in the direction of industrial regularization; that as soon as stability in the shop was threatened by forces of instability projected from the marketing environment, scientific management was compelled to turn to the task of putting that environment in order. The task has hardly been begun, but scientific management is patient and never releases its educational pressure.

Stabilization of General Administration

The war and its aftermath brought into sharp focus the function in enterprise which governs all other functions—general administration, which is concerned with the establishment, development and policies of an enterprise, and with the co-ordination of its functional units. During the war the dilution of the personnel of industrial organizations created new problems of rapid selection, training and co-ordination. Then the depression of 1920 brought out sharply two additional problems of general management: forecasting the effects of the new buyers' market, and the formulation of appropriate policies and plans; and the necessity of even greater economies through more precise control of the relations between units of enterprise which had been permitted to operate with such an absence of control as to neutralize each other's effectiveness. The frozen inventories which characterized that depression, for instance, were evidence of the prevalence of neglect in planning and co-ordination of sales, production and purchasing. Many of the larger enterprises which had been built up by consolidation discovered that their major units were not effectively integrated. Industry began to give attention to these problems and more generally to bring general administration under a control, already exemplified in a few more progressive enterprises, analogous to that previously established in production and being established in marketing. The development of this general administrative control was essentially a compelled application of the principles and technique of scientific management in a still larger area of influence.

The application of the principle of research in general administration has had two noteworthy aspects. In the first place, technical interest was turned to the history and development of industry, the characteristics of consumer demand, competition between industries, analyses of tendencies, and forecasts of the probable future of demand. Many of the larger enterprises established large and costly administrative research departments. Middle-sized enterprises came to accept, with respect to general information desired, the findings of professional institutions of industrial-economic research; and they supplemented this information by investigations relating to their respective industries, conducted by their own economic research units. Smaller enterprises began to utilize the reports of professional statistical bureaus, which as a group appear to have become a permanent institution of information service to American industry.

Also general administrations began to give more serious attention to the already-established researches of production and sales departments. These were improved individually and brought into a relationship which made them more useful tools for co-ordination and control of departmental efforts. The most noteworthy objective result of this integration is the modern form of the budget. The primitive form, devised to control the use of funds in accordance with an allotment on the basis of arbitrary judgment, has now become an effective element of co-ordination based on researches relating to the market and its demand, sales facilities and costs, and production facilities and costs. The budget is to the enterprise as a whole what the operation order and instruction card are to the individual workplace.

The principle of standardization has proved of the greatest significance to the stabilization of an enterprise through general administrative control. In any area of managerial responsibility the basic fact has become clear that until the results of research are formulated in the form of standards of what is to be done and how, there can be no co-ordination and control, and no economy resulting from integration of individual efforts. Nowhere is this clearer than in general administration.

For its own purpose, therefore, it has come to demand of operating departments more and better standards. An effective budget must start with reasonably accurate forecasts of the probable activity of business in general, of the particular business, and of the sales of the items which it produces—in as predetermined quantities and prices as is possible. It must then be built up with reasonably accurate forecasts of all production costs involving predetermined requirements and costs of materials, machines, tools, labor and overhead. This is one reason for the rapid and widespread increase of time study during the past decade, and the development of mechanisms like standard costs.

The experience of scientific management in general administration has brought out an important fact, fundamental among the implications of this paper and pertinent to the general subject of this Congress, that the development of a technique of general administrative research, standardization and control indicates that there may be no limit to the manageable size of enterprises; that, if we learn our lessons of experience and develop our technique accordingly, probably whole industries and the grouped industries of national and international areas may be made subject to a manageable control. There are now in the United States and Europe consolidations of enterprises, diverse as to the nature of their products and geographically widely scattered, which are managed more effectively than even small enterprises were managed a decade ago.

This is because industry is learning how to achieve through research and standardization an effective balance between centralization and decentralization. So long as managerial customs, especially absence of standards, compelled the chief executive to make every decision, whether relating to policy or to specific performance, there was a limit to the effectiveness of central control. Under those conditions a point was reached where the losses from the inefficiency of an overloaded individual were greater than the losses resulting from absence of balance between decentralized operations. It was believed that a size of enterprise could be reached at which inefficiency of one or the other kind would be inevitable, and therefore that there is a limit to manageable size.

But the progressive widening of the area of scientific management points the way toward a solution of the problem. On the one hand planning of research-determined purpose, policies and specific results, and provision of standard, research-determined facilities, can be centralized for any number of unit plants. The planning department of the general administrative offices of a group of integrated enterprises can establish standards of policy, purpose and specific results for the constituent enterprises considered as units, just as the planning department of the general administration of any of the unit enterprises establishes co-ordinating standards for its sales, production, finance, purchasing and personnel departments, and just as the planning department of the shop establishes co-ordinating standards for the unit workplaces in the shop. On the other hand the actual conduct of operations to accomplish the predetermined co-ordinated results may be left to those best informed concerning the variable conditions of accomplishment in the several local areas.

Furthermore, this harmonization of centralization and decentralization over ever larger areas of management has tended to bring with it greater democracy within the enterprise. Scientific management is realistic; as has been said, it attempts to establish a reign of the laws of a situation. To have validity and durability these laws must be found in the situation and not be imposed upon it from without. The process of discovering them in a situation and of formulating them for common observance according to logical relationships and responsibilities is an experience in co-operation, which is an experience in democratization. The harmonizing of centralization and decentralization is not unrelated to the progressive stabilization of industrial relations described in an earlier section.

It should be noted—a fact of transcending importance—that the ability to control huge multi-plant enterprises through harmonizing of centralization and decentralization is possible only where there is a preceding progressive development of scientific management in every lesser area of an enterprise; in unit operations, production in general, merchandising, general administration and human relations. It is the splendid fruit of these basic developments. Control of such huge enterprises is dependent on controls throughout every unit of the enterprise; the larger an area of control, the more essential is control in every constituent unit. Therefore effective rationalization of an entire industry, or of all industry in a nation, is possible only to the degree that constituent plants are scientific management plants.

It is therefore apparent how fundamental are the principles derived from the technique first developed by Taylor, the young assistant foreman, to co-ordinate and control a small group of machines in the shop at Midvale back in the early eighties. He summoned inductive science to his aid. Investigation and experiment disclosed a new world of facts and principles. In the light of these principles he established a new, universally-applicable technique of management, involving research, standardization, control and co-operation. Although devised to solve the problem of managing only a small group of machines, this technique is so fundamental that it has been applied progressively to management of the entire shop, to management of the entire enterprise and to management of groups of integrated enterprises.

So much for individualistic enterprise. But there remains the inevitable question: Can society adapt this technique to the management of its industry on a still larger scale—collectively—at the same time preserving the values of individual initiative and self-expression as they have been heretofore preserved in the onward march of scientific management?

II. Future

Stabilization of an Industry

The United States has not had experience in the stabilization of entire industries. That has been impossible because of a philosophy of individualism and competition which dominates public opinion and is expressed in legislation. An outstanding characteristic of legislation affecting business during the past half century has been its aim, on the one hand, to avoid government ownership or control and on the other hand, to prevent in private industry the formation of trusts, combinations and various types of agreement which would bring centralized control of an industry. That the members of an industry should be permitted to get together for the purpose of stabilizing it, is a concept shocking to general opinion—and not unreasonably in the light of past experience. That stabilization through government control should be thought of at all is even more shocking to industrial opinion in particular. In the face of an integrating technology the government has attempted to preserve primitive forms of competition. But there is an emerging public consciousness of inconsistency between the motives and procedures of productive technology and those of competitive enterprise. There is thinking about it in these days of severe depression as never before; for the logic of technological development is pressing for a solution of the problem of instability on the scale of entire industries.

Notwithstanding basic assumptions, technological development has already had some slight influence in modifying the conditions of blind competition. In one instance this has been quite open, but in most instances indirect and gradual. Legislation governing the organization and operation of railroads is openly a consolidating and stabilizing influence under government regulation. The decisions of the Supreme Court have of late tended toward a more liberal interpretation of the restrictive legislation affecting group conduct. The attorneys general have been co-operative in permitting[27] "uniformity of policy and practice which will be of assistance to business men who desire by co-operative methods to eliminate waste and unfair practices in industry and at the same time keep strictly within the law." The Federal Trade Commission holds conferences with representatives of trade associations executives and announces that its meetings are "further evidence of the desire of the commission to enlist the co-operation of business men in the discharge of its functions on the basis of confidence and understanding."[28] The Department of Commerce has for a decade been promoting a movement toward greater standardization of the products of each trade, and in some industries has achieved noteworthy simplification of varieties. Certain industries, notably the steel industry, have established institutes to accomplish such stabilization as is permitted by law, and not a few industries have appointed individuals—"dictators"—with authority of the industry to promote regularization through agreements as to common practices. The device of the holding company has had strong influence toward regularization, for it brings legally separate enterprises under the ultimate direction of concentrated ownership. Nearly every industry has its trade association which attempts to achieve some degree of regularization through educational processes. While there has not been, and could not at present be, any effort to organize any industry with such stabilizing effectiveness as that of some of the competing individual members, there has been progress in establishing uniformity of operating practices by making the best elements of technology and data concerning basic conditions of the industry common information of all members of an association.

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[27] *Trade Association Activities*, Washington, D. C., U. S. Department of Commerce, 1927, p. 2.

These associations are not permitted to engage in activities which would suppress competitive conditions. They may not restrain trade through concerted selling operations, concerted exclusion of outsiders from a market, agreements to curtail production or price-fixing agreements. On the other hand, they may regulate competitive conditions by maintaining exchanges of buyers and sellers, collecting and distributing statistical information concerning business and the particular industry, interchange of patent rights, interchange of credit information, joint negotiation of purchases, standardization of products and trade practices, the development of business standards, stimulation of demand, co-operative insurance, traffic bureaus, arbitration of disputes and co-operative research in management, as well as other phases of technology.[29]

Observe that while those things which they may do tend to promote uniformity in details of productive technology and commercial practices, it is those things which they are not permitted to do which are essential to stabilization of an industry. A budget for general administrative control of an industry conceived as one great enterprise, adjustment of consolidated sales to the consolidated market, or of consolidated production facilities to calculated consolidated demand, and the routing and scheduling of operations to individual enterprises (the workplaces of the industry) are impossible. Yet it is these things, as we have seen, which on a smaller scale have achieved stabilization of individual enterprises. It is failure to regularize competitive business enterprising as distinguished from technological processing that is responsible for such periods of depression as the United States is now compelled to suffer.

In this field the influence of scientific management has been limited. It has had influence on the development of technological uniformity among competing enterprises, especially as it has been brought about by trade associations and institute activities. The leaders of an industry who conceive the necessity and promote the organization of a trade association, and who serve on the directorates of these associations and determine their practices, are generally those individuals whose plants constitute the progressive group in the industry and have been strongly influenced by scientific management. The mental attitude of the managements of these plants, and some of their adapted technique, are carried over into the organization and operations of the trade associations. Such regularization of the industry as is permissible by law becomes the objective of the trade association just as it is the objective of individual plants. Investigation—the collection of technical and general trade information—is usually an important activity of the trade association. Standardization of procedures of managerial technology, such as cost accounting, and, to a certain extent, of products and materials, also is an important activity.

As a result of trade-association investigations and reports there is progressive accomplishment in helping member concerns to be more informed concerning the general technological and competitive situation in an industry. What items to produce, and their quantities, markets, costs and prices, are brought into some slight degree of informal adjustment by the fact that legally separate enterprises make their individual decisions more intelligently on the basis of an increasing amount of common information on these things in the industry.

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[28] *Loc. cit.*

[29] *Trade Associations: Their Economic Significance and Legal Status,* New York, National Industrial Conference Board, 1925, *passim.*

The stabilization of an industry in this casual manner is superficial and relatively ineffectual as contrasted with the stabilization of the individual enterprise which we have described. Any organized planning agency for planned control of an entire industry is legally impossible. Also the researches, investigations and standardization which are carried on are not determined by specific problems of control and therefore have not that inclusiveness, uniformity, consistency and general adequacy essential to effective regularization. The railroad industry through government regularization has become more stable than any other; the steel industry, because of the influence of one great corporation among competitors limited in number by the costs of capital investment, perhaps ranks next in stability; the electric-light and power industry through a pyramid of holding companies is becoming more stable. Except for these three instances, and the superficial regularization of other industries through the forces already indicated, the United States has no experience to offer along the line of stabilization of entire industries.

Yet the idea of stabilization of entire industries is at present receiving considerable thought in the United States. History is repeating itself. Just as it was once perceived that in an individual enterprise a workplace cannot be made stable without regularizing the entire shop, and production cannot be made stable without regularizing the volume of its business, so American managements are beginning to perceive that they cannot make an individual enterprise reasonably stable without regularization of the environment represented by the industry of which it is a competitive unit. But it is the leaders of the stronger industrial enterprises rather than the general public whose thoughts are turning in this direction. The former are thinking about the opportunities for regularization without sacrifice of individualism, which repeal of the restrictive legislation would afford. They do not think it wise to be too vocal in this thinking—a public utterance now and then is all that is discreet lest the fears of citizenship for monopolies be again revived. The general public, on the other hand, perhaps fascinated by the experiment of the Soviet republics, is thinking more about stabilization of the total industry of the country. This more inclusive concept, however, assumes as essential thereto, and as a matter of course, without much discussion, the concomitant stabilization of each component industry.

Stabilization of National Industry

The depression of 1929-1931 has had a profound influence on thinking in the United States. There are several reasons for this. The relative number of unemployed is probably greater than that of any previous depression. The industrial activity of 1929 was the most intense in American history and the psychological reaction to sudden depression correspondingly severe. There has been during the decade a considerable amount of technological unemployment, resulting from widespread introduction of new mechanical equipment and from consolidations, and this has affected not only skilled workers but also executives, and has given these intelligent groups cause for serious thought. The incomes of a majority of the people have declined and their standard of living has been reduced, which has caused a widespread feeling of economic insecurity. It should be observed, parenthetically, that psychologically the base from which security is measured is not a subsistence income but that income to which one has become accustomed. There is also the influence of the fascinating experiment offered by the Soviet republics. For these and other reasons the present depression has stimulated more questioning about the organization and management of industry than any similar national experience.

Those in the United States who hold doctrines which answer this questioning by advocating immediate nationalization of industry are few in number. But many conservative leaders of thought recognize that the feeling of economic insecurity affects so large a proportion of citizens that democratic processes of government may lead to remedial legislation which, if unplanned and piecemeal, may increase rather than reduce industrial confusion, and lead eventually to an irresistible movement for nationalization. To avoid this highly probable outcome in particular, and in general to preserve a system in which social organization and development is left to individual self-interest and initiative, they are giving attention to the problem of a better control of industry through some individualistic form of national planning.

The most conspicuous reaction to the present situation has been an increasing interest in measures for relief of unemployment; something more automatic and positive than emergency and temporary organization for application of the contributions of charity, which has heretofore been depended upon. The device which receives most favor is unemployment compensation.

Several of the larger corporations are making experiments in that direction. Probably the majority of industrialists believe that the establishment of systems of unemployment compensation should be left to individual initiative, each organization taking care of its employes in this manner. Many students, however, hold that there will never be any significant amount of unemployment compensation if its establishment is dependent upon individual initiative. They argue for some system of universal compensation mandated by the state, compensation to be made from a fund accumulated, not by taxation, but by annual contributions of employers, or of employers and workers jointly. Bills of this nature were introduced in the legislatures of several states during the early months of 1931.

Most of the thinking about unemployment compensation regards such compensation as a relief from conditions which cannot be avoided. Some, however, would construct the system in a manner which would require annual contributions to the fund in proportion to a contributor's spread between maximum and minimum payroll during the year, and thereby create an incentive for greater caution both in expanding and contracting employment. This would create by the state an incentive for better management and stabilization in every contributing organization.

The influence of the depression has been so marked that some leaders advocate more than unemployment compensation. Believing such compensation alone would not be a sufficient stabilizing influence, they are thinking audibly about control of industry through some form of national planning. Such leaders as Owen D. Young, Chairman of the Board of the General Electric Company, Alfred E. Smith, four times Governor of the State of New York and recent candidate for President of the United States, Glenn Frank, President of the University of Wisconsin, and the Rev. Harry Emerson Fosdick, Pastor of the Riverside Baptist Church, New York, have publicly declared that lack of economic statesmanship in general and of national planning in particular, are the causes of depression. At its annual meeting in December, 1930, the American Society of Mechanical Engineers modified its usually highly technical programs by the inclusion of a session devoted to discussion of national stabilization. The necessity for national planning was strongly emphasized there.

Generally in these discussions[30] the principle of control through planning, already proved in shop management and general administration, has been referred to as applicable on a national scale.

In 1929 the Committee on Recent Economic Changes of the President's Conference on Unemployment, declared in its report:[31]

> With greater knowledge of consuming habits, with more accurate records of the goods consumed, a sensitive contact has been established between the factors of production and consumption which formerly were so often out of balance... To maintain this balance and to extend it into fields which are not now in balance with the more prosperous elements of the nation, is clearly an important problem of leadership... Our complex and intricate economic machine can produce, but to keep it producing continuously it must be maintained in balance... Informed leadership is vital to the maintenance of equilibrium. It depends upon a general knowledge of the relations of the parts each to the other. Only through incessant observation and adjustment of our economy, can we learn to maintain the economic balance.

This report was rendered during the height of the 1929 industrial activity. It made little impression on the public. Perhaps the phrase: "a sensitive contact has been established between the factors of production and consumption which formerly were so often out of balance," was read as an assurance that complete and permanent balance already had been achieved!

In December, 1929, with the above Committee Report as a basis, the Taylor Society at its annual meeting opened public discussion of the problem, and emphasized the question whether economic balance does not require that the technique of planning developed in individual enterprise should be applied on a national scale.[32] Again at its annual meeting a year later, December, 1930, the Society provided for continuation of the theme by offering certain definite propositions for discussion under the caption: "A New Challenge to Scientific Management." These propositions should be of interest to this Congress.[33]

> The propositions presented for discussion this evening center about the concept that the operations of industrial society are not yielding the greatest possible good to the greatest number of industrial citizens. This is because these operations are not now, although formerly they may have been, organized with that end in view; and more particularly because of an inconsistency between the basic principle of business enterprise —individual self-interest and intuition—and the basic principle of the production technology which that enterprise, without full appreciation of its influence, has come to use—co-operative integration. The result of this inconsistency is periodic dislocations of industrial processes, stoppage of livelihood activi-

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[30] For current magazine comment cf. *The New Republic*, December 10, 1930, p. 85; and *Commerce and Finance*, December 24, 1930, p. 2350.

[31] New York, McGraw-Hill Book Company, 1929, Vol. I, pp. xxi, xxii.

[32] *Bulletin of the Taylor Society*, Vol. XV, No. 1, February, 1930, p. 2.

[33] *Ibid*, Vol. XVI, No. 2, April, 1931.

ties and of income for a large proportion of the population, and consequent ultimate impairment of progress toward a balanced and harmonious social life.

In its general outlines the concept is not new. For centuries there have been those, who, dissatisfied with the economic conditions of their lives, have constructed utopias and formulated doctrines of a better organized society. On the whole, however, these utopias and doctrines have not been in accord with the possibilities presented by the technologies of their respective times, and have involved sudden and revolutionary change.

The conspicuous new element in the concept today is recognition of present characteristics of industrial technology, which has undergone great and rapid change during the past half century. What is involved in the present approach to the problem is not revolutionary reconstruction but evolutionary consistency. It is argued that new principles of organization and control of individual enterprises, and of integrated groups of individual enterprises, have been developed and validated, and that if these were applied to the organization and control of industrial society conceived as an organic whole, many and perhaps most of the forces which now cause periodic dislocations and distress in industrial life would be eliminated.

With this brief explanation the following propositons are submitted for discussion:

Proposition 1. Scientific management has given the individual industrial enterprise, whether single unit or multiple unit, a body of principles and a pertinent technique of management involving:

a. Research in its various forms—the basic approach to a solution of the multiple problems of management;

b. Standardization—the specification of purposes, policies, plans, projects, facilities and methods, as the relatively constant factors in terms of which plans may be made and their execution directed, measured and appraised;

c. Planning and control—the organization and direction of the application of facilities along predetermined lines for accomplishment of purposes, policies, plans and projects;

d. Co-operation—recognition and acceptance of the laws governing managerial situations discovered by research, formulated in standards and utilized in planning and control.

The application of these principles has demonstrated the practicability of internal stabilization of the individual enterprise: i.e., control of variation in the relations and composite influence of the internal factors of the enterprise. The elimination of internal maladjustments, except when caused by the impact of forces outside the control of the management, may be regarded as practicable.

However, it should be noted, the internal stability of an enterprise established by scientific management is frequently nullified by the impact of forces of the industrial environment outside the control of the management.

Proposition 2. During the past century, and with rapid acceleration during the past quarter-century, production technology has developed along the lines of increasing mechanization, and of specialization and division of labor not only as between individuals in a particular enterprise but also as between enterprises and functional groups of enterprises. This has created an increasing interdependence among individuals, enterprises and groups. These organic inter-relationships are so intricate and delicate in their adjustments as to expose the industrial organism at any one of numerous points to maladjustment which is reflected all along the line of inter-relationships. These maladjustments occur periodically, and take the form of a serious stoppage of productive processes and of the distribution of social income, with serious consequences to numerous individuals who are dependent upon that income for maintenance of their standard of living, and in some instances for their subsistence; and with serious consequences also to enterprises which are dependent for maintenance of stability upon continuous transformation of material goods into free capital for reinvestment.

Proposition 3. There are two principal reasons for these maladjustments of organic relationships and their serious consequences. On the one hand, the adjustment of relationships is left to the "working of natural economic forces" in the negotiations of business—really the chance composite influence of a vast number of enterprises motivated by individual gain in competitive activities, limited in their perception of relationships and the organic consequences of their activities, and on the whole dependent upon intuition for their decisions as to purpose and method. On the other hand, the organization and direction of established social mechanisms upon which even individual enterprise has long been dependent, such as currency and credit, is along similar lines of individual initiative, control and intuition.

In other words, the basic individualistic processes of business enterprise no longer operate in harmony with the vast superstructure of inter-related technological processes of the actual production of social utilities. This abscence of harmony is not merely negative, but is a positive force generating periodic dislocations more and more destructive in their influence in the whole social structure.

Proposition 4. This lack of harmony between the processes of business enterprise and the technological processes of production of utilities may be removed or at least measurably reduced by deliberate efforts of industrial society to bring them into harmony; efforts which presumably must proceed along the following lines:

a. Common recognition of the problem and analysis of its causes and consequences;

b. Voluntary establishment of some form of self-government in industry dependent for its effectiveness on the acceptance by individual enterprises, for the common good, of the necessity for greater limitation to individual freedom in business activities than is at present assumed to be desirable;

c. Application of the principles of scientific management developed and validated in the individual enterprise (as presented in the first of this series of propositions) to industry conceived as one vast enterprise in which all members of industrial society are workers and shareholders in common with each other.

Inasmuch as the application of these principles has in individual enterprises increased the opportunity for adjustment, initiative, self-expression, accomplishment, and stabilization of purpose and effort on the part of those co-operating in these enterprises, it is a reasonable assumption that the application of these same principles on a larger scale will promote more generally throughout industrial society opportunity for adjustment, initiative, self-expression, accomplishment, and stabiliza-

tion of purpose and effort on the part both of individuals and enterprises.

The co-operation integration with which these propositions declare business enterprise must be brought into harmony is the result of a number of forces which have influenced American industry. Conspicuous among these is scientific management. It, in its way, gives the world a new capacity for productivity and a new delicacy of relationships in that productivity. Conspicuous also is large-scale enterprise, which in its way gives new capacity for production, and at the same time, by gathering huge blocks of capital and labor into single enterprises in an individualistic, freely competitive economy, concentrates risks and multiplies the number of individual maladjustments resulting from maladjustment of a single enterprise. It is becoming apparent that the scientific management which has given a nation new productivity must be applied to at least national planning of the use of the productivity for the purpose of establishing national stability.

Europe is more familiar than the United States with this concept of national planning and control of industry. Before the war, development of the cartel represented a first step toward national direction of the organization and forces of industry. The necessities of war compelled a more far-reaching control of national industries in the several European countries than in the United States. Post-war rehabilitation problems have required continuation of a larger degree of national direction of industry than in the United States, and have stimulated consideration of it as a permanent national policy. The writings of Walter Rathenau, justly called the father of rationalization, carrying the credentials of Rathenau's genius as a successful organizer and administrator, have made a profound impression on European thinking. It is on this plane—the national planning and direction of industry—that rationalization and scientific management meet and merge into each other. Rationalization, expressive of national stability as a desire or goal, lacked only a detailed technique. Scientific management brings this technique. Scientific management, originating in individual enterprise and never conceived at the beginning as affecting any area larger than the individual organization, but having a strong social sensitiveness. lacked only the occasion for definite formulation of a larger social mission. The concept of rationalization has brought such a mission to it. The vision of national stabilized industry created by one, and the technique of establishing stability created by the other, may now merge into one creative whole of purpose and technique.

International Stabilization of Industry

Those who are not afraid to take the next step in thinking compelled by the logic of experience, see clearly that the progress of regularization cannot stop even on the plane of national stabilization. National stability cannot be completely established without international stabilization. As we have said, one thing is written clearly in the history of scientific management; namely, that no lesser area can be completely stabilized if an environing area is left unstabilized. Complete stabilization of the workplace compelled stabilization of the shop; complete stabilization of the shop compelled stabilization of the enterprise and many now recognize that complete stabilization of an enterprise requires stabilization of industry on a national scale. Finally, as J. A. Hobson says in a statement in which the word rationalization is loosely employed:[34] "The world is in effect a single economic system, and the improved or impaired productivity and consumption of every part affects every other part. Closer and more effective international movements for such improvements in the distribution of income as will enable world consumption to keep pace with and stimulate improvements in production, form the foundations of the progressive economy and the humaner civilization of the future. This can only be achieved by carrying the principle of rationalization a step further."[35] Logic compels us to consider the necessity of ultimate stabilization of world industry by world-scale application of the principles of scientific management. All the forces of national habits, prejudices, chauvinism and entrenched self-interest, are arrayed against such an ultimate application of the principles. Yet boldness in thinking and eventually in conduct ever have been the basis of progress.

A citizen of the United States must acknowledge frankly that, as evidenced by the record of international relations, his country is likely to be the last one to give effective response to this concept of international stabilization. But let us not forget that the American is flexible and adjusts himself to new requirements perhaps more readily than most peoples. A continent of rich natural resources has made him self-sufficient. The task of exploring and subduing that continent has occupied his interest and energies. Until recently there has been no need for him to be internationally minded. Very recently, however—within months rather than years—there has been startling evidence in the press that industrial leadership in the United States has begun to think internationally. From time to time there have been public utterances indicating that influential leaders have come to realize that the new industrial technology and its relationships are international, that international factors play an appreciable part in the depression from which we are now suffering, and that the problem must be attacked on an international plane at the same time it is attacked on a national plane.

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[34] The term rationalization is given so many meanings in current European usage that it is losing distinctive meaning. To the present author the term rationalization connotes primarily the desire or goal of collective organization of industry without implication of the technique of achieving it; while scientific management connotes primarily a technique of organization and management without implication of the area to which it is applied.

[35] *Rationalisation and Unemployment*, New York, The Macmillan Company, 1930, pp. 124, 125.

There are several reasons why these leaders have within a short time acquired a new outlook. The United States has become a creditor nation and it is recognized that a creditor nation must have close and stable international relationships. Many industries have become so productive that open international markets are essential to preserve the capital already invested, and the managements of these industries perceive that the state of industrial collapse and restricted purchasing power throughout the world, and an intensified nationalism expressed in higher tariff barriers, are obstacles to world trade. Other industries, such as oil and sugar, have come to realize that intensive competition in these basic necessities on a world scale can be industrially and socially disorganizing.

This new outlook has been expressed during the past six months by a succession of public utterances which, in the weight of influence behind them, are suggestive of an eventual about-face in the mental attitude of the United States toward international relations. Owen Young, Chairman of the Board of the General Electric Company, at a dinner of the Lotus Club[36] declared that politics and economics are in conflict; that the former is becoming more nationalistic the world over, while the latter with great rapidity is becoming more international. Economics is refusing to recognize frontiers and is forcing itself toward an integrated world. This conflict between politics and economics, he said, is one of the causes of present world troubles.

A week or so later Thomas L. Chadbourne, an attorney representing American sugar interests at the Brussels international sugar conference,[37] argued before that conference that all industries have been led by greed to transgress economic laws; that the underlying issue of rehabilitation of production and consumption on a balanced basis is greater than that of the sugar industry alone; that the capitalistic system is on trial.

In January Paul M. Warburg, Chairman of the Manhattan Company, New York, and director in several banks, condemned the isolation attitude of mind;[38] Virgil Joran, economist of the National Industrial Conference Board and an editor of *The Business Week*, New York, advocated international stabilization of money;[39] Albert H. Wiggin, Chairman of the Chase National Bank, New York, recommended reduction of war debts and lowering of the tariff;[40] and E. N. Hurley, President of the American Manufacturers' Export Association, Chicago, asserted that the stimulus to European industry through reduction of war debts would be also a stimulus to American industry.[41] In February, George E. Roberts, Vice-President of the National City Bank, New York, recommended international stabilization of gold;[42] and John McHugh, Chairman of the Executive Committee of the Chase National Bank, New York, took a stand with those advocating tariff reduction.[43] In March Dr. Benjamin Anderson, economist of the Chase National Bank, also spoke in favor of tariff reductions.[44] The following is a quotation from the address of Mr. Wiggin, noted above: "Is it not to be hoped that even the blindest among us may now begin to see that our prosperity is interlocked with that of our neighbors and customers . . . ?"

It should be understood, of course, that these leaders are representatives of the most strongly intrenched capitalistic industry in the world and are faithful to it; and that they are not implying that capitalistic industry should be replaced by any other form of organization of industrial society. But they have the vision to see and the boldness to declare the evils that result from the discrepancy between particularistic political economics and realistic industrial economics; and to challenge industry to attack these evils.

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[36] *The New York Times*, December 7, 1930.

[37] *Ibid.*, December 12, 1930.

[38] *Ibid.*, January 9, 1931.

[39] *Ibid.*, January 11, 1931.

[40] *Ibid.*, January 12, 1931.

[41] *Ibid.*, January 29, 1931.

[42] *Ibid.*, February 1, 1931.

[43] *Ibid.*, February 18, 1931.

[44] *Ibid.*, March 22, 1931.

As these evils are attacked it will be more and more realized that the world is not merely an aggregate of unrelated units in a plus relationship, but an organism of integrated members. An evil to one is an evil to all. An evil to a fraction of the whole shakes the security of the whole. Remedies must be applied all along the line simultaneously to each unit and to each minor and major group of units. International stabilization will be found to be related to national stabilization; the latter to stabilization of each major industry; the latter to stabilization of each constituent enterprise; and consequently any of these to all the others.

Therefore the technique of stabilization of industry internationally must correspond to the lines of stabilization of national industry, and that to the lines of stabilization of each constituent enterprise. On none of these planes will arbitrary, autocratic, impulsive attempts to regularize through mere particularistic contracts or other forms of agreement be adequate. The basic conditions of regularization and the part which each unit and group is to take must be discovered by research; these must be formulated through standardization into individual, national and international rules of conduct; control by understanding observance of these standards must be realized; and permeating all must be a spirit of inter-individual and international co-operation. This would be scientific management on a world plane.

If our world were a wise world; if it could perceive that most of the urgent problems disturbing it reduce to the common denominator of disorganizing particularism; if it had the will to cast this aside and the courage to act promptly; then the year 1932 would be an *annus mirabilis* of simultaneous correlated conferences; a great international conference working out regularization of world industry; an industrial conference in each nation working out stabilization of national industry; national and international conferences of great industries, each creating for itself a reign of law; and in every industrial community co-operative efforts of individual enterprises to apply the stabilizing force of scientific management. These conferences would approach their tasks not with the spirit of political discussion and negotiation, but with that of creative reorganization. Through these a world adrift could eventually be brought to helm and guided into calmer seas of sound human relationships. In further drift there is danger of being shattered upon the rocks of blind industrial and political conflict.

End of the paper presented at the Amsterdam Congress.

Postscript—December, 1932

Nearly two years have passed since the above paper was submitted to the Secretariat of the World Social Economic Congress. During these two years progress in the United States in thinking and writing about the economic problem now perplexing the world, and about regularization of the development of industry, has been noteworthy. It is the purpose of this postscript to review the progress briefly.

What the writer has said about scientific management in the control and regularization of the operations of the individual enterprise stands without change and without further comment, although it is difficult to resist the temptation to cite cases in which scientific management—the genuine brand—has permitted certain enterprises to adjust to their 1931-1932 environment and thrive. What has been said about international planning also stands with only a word of comment. The year 1932 proved not to be such an *annus mirabilis* as the writer pictured in his concluding paragraph. International action remained in the area of politics and was concerned primarily with the political approach to the problems of reparations, tariffs and national self-sufficiency, and in general with continuation of that individualistic attitude which is the prime cause of present troubles. This should not astonish anyone, for the world has not yet suffered enough to become vitally interested in the common causal factors of its suffering. It was to be expected, in the light of past history, that concern at the present stage of suffering should be in national problems and thinking about possible economic determinism restricted to that area.

In the United States thinking about the national problem has been as noteworthy as was that in the colonies prior to the Revolution and that in the states prior to the Civil War, and has been comparable to these in quantity, range and quality. In addition to books and magazine articles there has reappeared a pamphleteering reminiscent of earlier crises.[45]

Discussions of the concept of national planning *per se* have been in a minority in this new literature. Yet this should be observed: such discussions as these constitute the more substantial portion of the literature;

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[45] In addition to significant books on the depression which have appeared in England (Cole, Henderson, Hobson, Martin, Salter, Stamp, etc.) the following have appeared in the United States during the past two years: Baker, C. W., *Pathways Back to Prosperity*; Beard, C. A., editor, *America Faces the*

and further, of especial significance, the discussions which have presented partial or special attacks on the industrial problem in other terms than planning have nearly all implied, for making the special attacks effective, some collective mechanism which assembles data currently, devises application of the particular remedy advocated and measures the results of successive doses of application. For instance, it is impossible to conceive an effective attack on the problem through a regulated currency, or control of credit expansion, or redistribution of social income through taxation and social services, or restriction of labor hours, or other special devices, without a measuring and applying instrumentality which expresses essentially the principle of national planning. In considering any one of these proposed devices the question at issue is not whether planning is involved, but whether the planning involved is adequately provided with instruments to accomplish the desired result.

At this point a parenthetical note is in order about planning as conceived by scientific management, to supplement what has been said in the original paper. Many reject the concept of national planning because they assume that it requires an arbitrary and detailed control by the planning agency of the operations of every individual enterprise, and would thereby destroy the values in individual initiative and self-expression. But that is precisely what scientific management's planning and control in the individual enterprise do not do; and those who advocate carrying scientific management's technique onto the plane of collective affairs therefore do not conceive it as having any such effect on that plane. In the individual enterprise scientific management's control through planning frees one individual's initiative and self-expression from the restricting and counteracting influences of other individuals' whims, guesses and arbitrary conduct by subjecting all to the controlling law of the facts inherent in any situation defined by the common objective. In other words scientific management achieves its plans through control of the environment in which all the co-operating individuals work. It specifies the objective; and, as discovered by research, to accomplish the objective, the quantities and qualities of necessary materials, the quantities and qualities of machines and tools, the quantities and qualities of labor skills, the kinds and quantities of credit required, the most suitable methods, and so on. But within the limitations of this set of specifications the individual executive or worker is free to exercise all the intiative and self-expression of which he is possessed. It is the familiar contrast of freedom outside or freedom within the law. It is human experience that in the long run the latter freedom is the greater.

So in applying the technique of scientific management on the plane of collective conduct, the application would be made through control of environmental factors within which "law of the situation" individual initiative and self-expression would find its freedom—a greater freedom than it realizes under present conditions. The enterprise that in 1925-1929 was forced, in order to keep its head above the engulfing waters of inflated activity, into competitive efforts that resulted in wasteful "profitless prosperity," and that since 1929 has been forced to submit to costly idleness, cannot be claimed to have enjoyed on the whole a very great freedom of initiative and self-expression.

The ferment of thought expressed in the industrial literature of the United States during the past two years is more dramatically indicated in a vogue which has as yet hardly any literature. The reference is to *technocracy*. Perhaps the dramatic manner in which this concept has seized the American imagination is due to the abscence of authoritative expository literature and to the freedom of every individual to construct its content according to his own imagination. Technocracy seems destined to play about the same

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Future; Boucke, O. Fred, *Laissez Faire and After*; Chase, Stuart, *The Nemesis of American Business and Other Essays,* and *A New Deal;* Crowther, Samuel, editor, *A Basis for Stability*; Dahlberg, Arthur, *Jobs, Machines and Capitalism*; Deane, Albert L. and Norton, Henry Kittredge, *Investing in Wages*; Dennis, Lawrence, *Is Capitalism Doomed?*; Donham, Wallace Brett, *Business Adrift,* and *Business Looks at the Unforeseen*; Douglas, Paul H., and Director, Aaron, *The Problem of Unemployment*; Ely, R. T., *Hard Times: The Way In and the Way Out;* Fairchild, Henry Pratt, *Profits or Prosperity*; Filene, Edward A., *Successful Living in This Machine Age*; Flanders, Ralph E., *Taming Our Machines*; Graham, Frank D., *The Abolition of Unemployment*; Haan, H., *American Planning in the Words of Its Promoters*; Hansen, Alvin H., *Economic Stabilization in an Unbalanced World*; Harwood, E. C., *Cause and Control of the Business Cycle*; Hollander, J. H., *Want and Plenty*; James, F. Cyril, *The Road to Revival*; Javits, B. A., *Business and the Public Interest*; Laidler, Harry W., editor, *Socialist Planning and a Socialist Program*; Lawrence, James C., *The Year of Regeneration*; Lippman, Walter, *Interpretations, 1931-1932*; Mazur, Paul M., *New Roads to Prosperity*; Patterson, Ernest Minor, *The World's Economic Dilemma*; Rogers, James H., *America Weighs Her Gold*; Soule, George, *A Planned Society*; Thomas, Norman, *America's Way Out*; Tipper, H., *The New Challenge of Distribution.* This list is not intended to be complete. Also articles inspired by the depression have appeared in such periodicals as *American Mercury, Annals of the American Academy of Political and Social Science, Atlantic Monthly, The Chase Economic Bulletin, Fortune, Harper's Magazine, The Nation, The New Republic, Scribner's Magazine,* and *The Survey Graphic.*

part in stirring the popular imagination today as the concept of efficiency did in the period following 1912. And probably it will, as did the concept of efficiency, within a short time find that its great mission has been to stimulate both the imagination and the thinking of the American people. Except as a dramatic set-up it appears to present little not already familiar to economists.[46] Its diagnosis of economic ills has been more completely and convincingly stated in Fred Henderson's "The Economic Consequences of Power Production." Its implications as to what should be done to establish economic life on a sound basis is seriously wanting in what Soule calls "the engineering of human consent." But it is significant that this particular movement of thought which is today arousing such widespread popular interest involves a collective planning more positive and detailed in its control of individual units of production and individual consumers than is possible in the thinking of one familiar with the philosophy and technique of scientific management.

During the two years under review the concept of national planning has found expression in more than books and the dramatic vogue of technocracy. There have been specific proposals looking toward one and another degree of national planning.[47] Haan lists five "official and semi-official proposals" and fourteen "private proposals," and others have appeared since his study was made. Among the most noteworthy from the point of view of the specific nature of their plans are the bills introduced in the Congress by Senator LaFollette and by Representative Person, and the Swope, Harriman (Committee on Continuity of Business and Employment, United States Chamber of Commerce), and Clark-Smith-Soule plans. It is not necessary to consider the natures of these and the other proposals and the differences between them. Present interest is served by calling attention to the significance of their appearance during the past two years.

Of more significance is the fact that some sort of national planning is not only the order of the day but actually is in process of evolution. The question now is not whether it shall be but what it shall be. The Interstate Commerce Commission, the Federal Trade Commission, the Federal Reserve Board and similar institutions were primitive institutions of evolution toward genuine planning. The biggest step of all was the Reconstruction Finance Corporation, which has made the government so interested a party in the future development of railroads and other great corporations that some sort of collective provision for the future of that interest is inevitable. Impending federal legislation for relief of agriculture and legislation by states establishing compensation for unemployment will compel the setting up of other institutions for administration, including planning and regularization, These steps cannot be retraced. The only way out will prove to be further steps in the same direction, consisting essentially of bringing together and harmonizing all of these individual institutions within some framework of co-ordination. The writer believes the die has already been cast. Our most fruitful inquiries will now be directed not toward whether there shall be national planning, but toward what form the planning shall take.

On this point a real issue confronts the American people. The issue is whether planning shall be delegated to industry itself in some form of self-government, with anti-trust legislation modified for that purpose, or to some body representing citizenship in its more inclusive interests. If the former policy is adopted planning will undoubtedly be along the line of cartelization, self-regulation of further investment, restricted production, price maintenance, and in general conservation, insofar as it is possible, of existing equity values and ownerships. This might mean a regularized sector of industry within the area of industry in its larger aspects.[48] If the second policy is adopted, planning will be social-economic, and will be concerned primarily with consumption, the standard of living, elimination of unemployment and, in general, the social organization, to which ends business enterprises will automatically become instruments through control of the environment in which they operate and of the social mechanisms which they use. The choice of one or the other of these divergent policies is perhaps more momentous than any choice which the United States has yet been compelled to make.

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[46] See for a reasonable appraisal "Technocracy, An Interpretation," by Stuart Chase, a John Day pamphlet, 1933.

[47] Cf. Haan, Hugo, *American Planning in the Words of Its Promoters*, The American Academy of Political and Social Science, Philadelphia, March, 1932.

[48] The point of view of this policy is perhaps most boldly and clearly expressed by an industrialist who does not concede the need of organized planning. Said Myron C. Taylor, Chairman of the Board of the United States Steel Corporation, in an address in Boston on March 24, 1932: "Controlled production may be expected to come about automatically, as our surplus stocks become exhausted, and as competition, spurred by necessity, discards obsolescent production equipment and adopts justifiable price control that sacrifices some part of production volume to secure reasonable price levels for commodities." He added that this means further mechanization and technological unemployment and the return of many industrial workers to the land.

Applied Scientific Management[1]

II. Organization and Classification

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THE TWO things which most seriously detract from the effectiveness of management probably are; first, the lack of a definite, logical plan of organization, and second, the lack of a clear definition of functions of authority and responsibility—their scope and limitations and their inter-relation with other functions.

In his writings Taylor advocated functional organization as an essential part of scientific management. Most of his references to organization related to functions, from those of the works manager down to the foreman. He was particularly interested in functions which pertained to production, including those of an indirect or auxiliary character.

Subdivision, or functionalization, of the major branches or activities of a business was at least well started, though not general, before Taylor's time; the larger companies had sales departments, engineering or at least draughting departments, purchasing agents and book-keeping departments. Frequently, however, the men in charge of these functions were not major executives completely responsible for their respective functions, but rather subordinate assistants to the head of the business. The extent to which this trend toward organization along functional lines may have influenced Taylor's thinking and his advocacy of functional foremanship during the late nineties and early in this century is problematical. In any event the trend toward functional organization increased with the growth of the scientific-management movement.[2]

In this article I am treating organization and classification together for the reason that effective organization must be in accordance with a logical plan which will bring together and clearly define those functions and activities of a similar nature. This provides for functional departmentalization as well as functionalization within departments, and places the responsibility for everything having to do with a particular class of work in the hands of specially qualified executives and assistants. By analyzing the major subdivisions of a company, we may again set up sections of a department each of which will be organized to deal with certain definite subfunctions or parts of the work pertaining to the department. These sections may be further subdivided into smaller units each of which will be responsible for the performance of what may be termed specific operations pertaining to handling the class of work for which the department and section may be responsible.

The procedure for working out a plan of organization and classification for an entirely new business and for one that has, like Topsy, "just growed," should be much the same. In the latter type the duties, functions and lines of authority are badly confused; correlation betwen productive subdivisions is lacking with the result that each is operating as an independent unit doing its own purchasing, storing, selling, maintenance, billing, etc. In this and the new business it is necessary to start by listing the various things that are to be done or that are being done. The similar things can then be picked out and grouped under appropriate headings. These similar things should then be examined to see if they may not again be combined into a smaller number of larger groups. This process of analysis and synthesis is made much easier if we start with a definite scheme of classification and symbolization, which enables us to tag the things as we sort them and hang them on the proper peg with others of their class. What I have said with respect to the classification of activities and functions applies equally to products, raw materials and equipment. So illuminating is the process of working out a classification for a business that this would be one of the first things I should undertake if I were taking over the management of a company. In doing so I should acquire in a very short time such an intimate and detailed knowledge of all phases of the business and its problems as I could otherwise only hope to acquire after years of experience in its operation.

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[1] This is the second of a series of articles which began in the October issue of the *Bulletin of the Taylor Society* (I. "Introduction: Its Applicability in All Areas of Management," p. 156)

[2] In his paper "Ten Years' Progress in Management, 1923-1932," Leon P. Alford comments on this as follows. "Functionalization of types of activity has spread and with it the specialization of individuals. Managers have recognized that to take full advantage of the natural aptitudes and exceptional abilities of executives, problems and duties must be narrowed in scope and submitted to special consideration and action. *Apart from Taylor installations, the most significant applications of functionalization have been made during the decade just ending.*" (author's italics)

Such a classification during the World War of the activities of a tremendously expanded Army Ordnance Department was one of the things which made it possible to build up in a few months an organization which would ordinarily have taken at least as many years to develop in a commercial establishment. Not only was the organization built up from a handful of commissioned officers and civilian employes to one of thousands of workers, but an inexperienced personnel was placed and assigned to clean-cut, definite duties and responsibilities in such a manner that it operated with an efficiency which attracted much favorable attention.

In its evolution the art of classification and designation seems to have passed through the following stages:

1. A serial number was arbitrarily assigned to things as they happened to occur. Typical of this is the scheme of numbering the machines in a plant in one series without regard to kind, size or type; thus, Machine No. 1 might be a planer, No. 2, a lathe, No. 3, a drill press, and so on. One milling machine might be designated by the number 73 while another along side of it, identical in all respects, might be 107. This primitive and ineffectual scheme is still to be found in many plants.

2. A certain range of numbers in the same series was assigned to a class; for example, under the designation of machines in a shop, numbers from one to fifty would be lathes; from fifty-one to seventy-five, planers; from seventy-six to one hundred, drill presses; from 101 to 125, milling machines, and so on. This is the first step toward a mnemonic system.

3. A range, as from 1 to 100, was assigned to one class; from 101 to 200 was assigned to another, and so on. This might equally well be from 1001 to 1999; from 2000 to 2999; from 3000 to 3999, etc. Here we begin to have an approach to the Dewey scheme of classification. As a rule under this scheme only the first numerals have significance for classification but in some instances a certain mongrel resemblance to the Dewey scheme may develop.

4. Then came the Dewey decimal system. Following out our illustration, 1 designated lathes, 2, planers, etc. Engine lathes might be designated as 11 and the particular type of engine lathe by the addition of another digit. Thus 111 would be an engine lathe of one type, 112 an engine lathe of another type, etc. Turret lathes would be designated by 12, chucking lathes by 13, etc.

5. The Taylor mnemonic system came next. Under this the letter B would designate boring mills, D drill presses, G grinders, L lathes, M milling machines, P planers, etc. Each of these classes of machines would be divided into subclasses according to variable characteristics. Thus, BH would designate horizontal boring mills, BV vertical boring mills. DR would designate radial drill presses, DB bench drills, DM multiple drills, LE engine lathes, LT turret lathes, LC chucking lathes. Further peculiarities of type, design or make would be expressed by adding appropriate letters. The size might be inserted in the body of the symbol thus: the symbol for a Monarch twenty-four-inch, geared-head engine lathe with a six-foot bed might be L246EGM. If we had several of these we should add the figures 1, 2, 3, etc., to the end of the symbol. By this method of classifying, all machines that are identical have the same designation except for the final figure. We also have a symbol which is largely self explanatory.

In a complete classification for a business the letters I have given as the initial class designation would, if the symbol were written out in full, be preceded by certain other letters to locate these machines in their proper place or class among the company's assets and in its equipment inventory. For example, in our primary grouping of main classes as designated by the first letters of our classification the letter Y would stand for all machinery; YP for power-plant machinery, YT for transportation equipment, YM for machines used in manufacturing, YMM for metal-working machines. Thus the full symbol for the engine lathe in question would be YMML246EGM1. In actual practice we omit the use of the letters YMM as being understood. This practice is also followed in the case of hand tools.

Strange as it may seem, the thinking of a great many people concerned with industry has not, in the matter of classification, progressed much beyond what I have described as the first or second stages. Many businesses muddle along handicapped to a greater extent than they realize by poor classification, or none at all. A shining example of faulty and inadequate classifications may be found in those prescribed by the various states for the public utilities and by the Interstate Commerce Commission for the railroads. Both the regulating bodies and the corporations have been inconvenienced by the restrictions which these classifications impose.

Taylor's references to that ingenious and valuable device which he designated as "the mnemonic symbol system for identification of parts and for charges" gave no indication which would enable the reader either to understand the nature of such a system, how to devise and apply it, the many valuable purposes that it served, or the years of work involved in its evolution. And yet it ranks in importance with, and is a valuable auxiliary to, all of the other features of scientific management. In "Shop Management" it is briefly mentioned in two instances. Under the head of "the leading functions of the Planning Department" Taylor says:[8]

> Some one of the mnemonic symbol systems should be used instead of numbering the parts or orders for identifying the various articles of manufacture, as well as the operations to be performed on each piece and the various expense charges of the establishment. This becomes a matter of great importance when written directions are sent from the planning room to the men, and the men make their returns in writing. The clerical work and the chances for error are thereby greatly diminished.

The second reference is even more brief and is a partial reiteration of the foregoing. In the evolution, or rather the development, of the mnemonic system of classification and symbolization, to the improvement and perfecting of which Carl G. Barth contributed more than the others associated with Taylor, as indeed he did to most of the features of the Taylor mechanism, Taylor followed the scientific principle of classification. This is to group all things into broad generic classes and thus bring into a relatively small number of principal groups everything of a similar or pertinent nature. A logical division of each of these primary groups or classes is then made into subclasses and this operation is repeated with the subclasses and their subdivisions until the original subject has been sorted out into its component elements.

The basic principle of the Taylor scheme of classification is identical with that of the Dewey decimal system of classification, which is most commonly used for cataloging books in libraries. This plan provides, for example, for the division of all works on all subjects into ten primary or main groups each of which is designated by a numeral. For example, general works are designated by O, philosophy is designated by 1; religion by 2; sociology by 3; philology by 4; natural sciences by 5; useful arts by 6; fine arts by 7; literature by 8, and history by 9. Each of these broad, generic classes or groups is then broken down into ten secondary groups, the designation of which is a number beginning with the figure assigned to the primary group. Useful arts, for example, comprise medicine, designated as 61; engineering as 62; agriculture as 63; domestic economy as 64; communication as 65; chemical technology as 66; manufactures as 67; mechanical trades as 68, and building as 69. Each of the ten secondary subdivisions of a main class is, or may be, again broken down or fanned out, into ten further subdivisions, and so on *ad infinitum*. A few minutes spent in any library will serve to make this principle and scheme of classification perfectly clear.

In his early efforts to set up a classification, Taylor made use of the Dewey system, adapting it to purposes of accounting, the designation of materials, tools and products. From two of his contemporaries, Oberlin Smith and Henry R. Towne, Taylor got the idea of using letters instead of numerals for purposes of designation. From this grew the plan of also using numerals in combination with letters, for the purpose of expressing numerical values such as sizes, piece numbers, lot numbers, operation sequence numbers, etc. These were appropriately placed in front or at the end of the symbol, or in a significant position between the letters composing the symbol. It will readily be seen that the use of letters, instead of numerals as in the Dewey scheme, affords more than double the classes and subdivisions that may be set up under that scheme, and further, the letters of the alphabet possess a mnemonic or suggestive value which is lacking in numerals when used to designate subjects, material things or activities. It will also be evident that if we use numerals to express subjects or things we are deprived of their use for the expression of many values which may not be expressed symbolically in any other way short of the development of a new set of numerals, or the employment, for instance, of those of the Japanese. For example, in a symbol composed of numerals, it would be difficult to signify, in a manner largely self explanatory, a historical work dealing with a European nation, specifically France, in the eighteenth century. With letters we should set it up something like this—HE18F. It would not be quite so simple as that, but that gives the idea.

The use of the alphabet as a base, and the combination of numerals therewith, seems so natural a course to follow that one wonders why the inventor of the Dewey system did not hit upon it. It is unfortunate that he did not, as a great many uses to which the Dewey system has been put, especially in the field of statistics and accounting, might otherwise have been much better served. The Bureau of the Census is an example. Two things have favored the use and extension to new fields of the decimal scheme of classification; first, through its application to library work many persons of widely varied interests became acquainted with it before Taylor's scheme was developed. Even today the Taylor method has been given publicity in such limited circles that very few of those who might profit by its use know anything about it. In the second place, tabulating machines, originated to handle census returns, were devised to use the decimal system. As the large corporations came into a realization of the possibilities of these machines in the fields of commercial accounting and statistical work they adopted them and with them, as a matter of course, the decimal system with all its limitations. We of the Taylor group were obliged, at least until recently, in our work for clients whose transactions were sufficiently voluminous to warrant the use of tabulating machines, to devise makeshift schemes for setting up on cards, designed for the decimal system of classification, symbols made up of letters and figures variously combined. A new development appears in part, if not completely, to have removed this difficulty. While the schemes to which I have referred as makeshifts were not all that could be desired they nevertheless were reasonably successful from a practical standpoint.

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[8] Pp. 115-116.

The classification for a business should be made up of the following sections:

Section I. This section should embrace the functions or activities of the business as set up along lines of organization. In this way a classification of activities will at the same time provide a classification of accounts to which the expenses incident to the corresponding activities are to be charged. For this reason the classification has been frequently referred to as the Classification of Expenses. This section of the classification should outline the organization, set up and define in an orderly and logical fashion its departments, their subdivisions and the purposes for which they exist. It is in effect an organization chart plus.

Section II. This section should embrace the various products of the company, grouping them in broad classes which are in turn broken down into subclasses and further subdivisions until the individual item or unit is reached. Each product should be designated by a mnemonic symbol which tells the whole story to the people regularly using it and enables anyone not so familiar easily, quickly and accurately to interpret it by reference to a copy of the classification. From an accounting standpoint these classes and their subdivisions serve as the accounts to which costs of work in process are charged and also as the subdivisions of inventory, sales and income accounts.

Section III. This section should do the same as the above for all of the purchased materials used in the manufacture of the company's products or as supplies in the offices and shops.

Section IV. This section should classify and group the company's plant and equipment in a similar manner. This includes real estate and buildings, machinery and tools, fixtures and appliances, patents, etc.

As these sections of the classifications are for certain purposes used more or less independently, it is customary in a plant to think of them as several separate classifications. For example, Section I is the Classification of Indirect Expenses or Departmental Activities; Section II, the Classification of Products, or Worked-Material Classification; Section III, the Stores (purchased material) Classification; Section IV, or at least those portions covering machinery and tools, the Tool Classification and the Machine Classification respectively. In these two instances it is customary to drop off in every-day use certain letters at the front of the symbol which locate it in the main classification.

In working up a classification it has been the practice to allocate the letters A to F to what I have referred to as Section I for the primary designation of organizational divisions. The letters G to W, except S, are allocated to Section II for the designation of primary classes of products. The letter S is assigned to Section III for stores. The letters X, Y and Z are assigned to Section IV to designate respectively tools, appliances and fixtures of a comparatively short-lived character, machinery and apparatus and real estate and buildings.

It would be more consistent with the basic principles of classification if instead of arbitrarily assigning a certain range of letters for the groups of things to be classified and symbolized we were to use an initial letter to designate each of the sections. It would also result in symbols that might possess a greater mnemonic quality. In practice, however, this is rarely found to be necessary or worthwhile.

The following is a typical set-up of the primary classes in Section I. The classification proper will indicate concisely for each major division of the business, the nature of its function, its scope and limitations, and its relation to other divisions. It does this also, on successive pages, for the subdivisions and their components. The major divisions are designated by an initial as in this typical set up:

A. *Auxiliary Departments,* operated for the benefit of several manufacturing departments. Among these are light, heat and power, stores, planning, maintenance, internal transportation, buildings and grounds, etc.

B. *General Business or Administrative Departments,* including executive (the office of the general manager), accounting, legal, purchasing, traffic. This major division is in the main composed of departments either concerned with activities of the business as a whole or with its relations to individuals, agencies or other organizations who render the company services.

C. *Sales Department,* consisting of general sales administration, advertising and sales promotion, sales research and development, sales planning and control, etc.

D. *Manufacturing Departments,* comprising all those departments in the works which are organized mainly for the production of goods to be sold as merchandise. This section of the classification is intended to provide for everything pertaining to such departments except their equipment and the specific operations directly performed upon products.

E. *Experimental or Product Research and Development Department,* embracing all activities connected with the development of new products, regardless of the source from which they may originate, the conduct of experiments and tests, improvement of existing products, their modification and adaptation to new uses, co-operation with other departments in the improvement of processes or the elimination of difficulties calling for special technical investigation and research, establishment and maintenance of standards of quality of products, and investigation of serious complaints in regard to products.

For each of these major divisions of the company's activities there should be a sheet setting forth the primary subdivisions; for each of these another sheet setting forth the secondary breakdown, and so on until the final subdivision is reached. Each of these steps extends the definition of the function or its subdivisions in a concise but comprehensive manner. For each department or its subdivisions it is desirable that there should be a standing order describing clearly, and in complete detail, the duties comprising its function, its responsibilities and authority and its relation to other departments and functions.

The departmental arrangement must, of course, be worked out to suit the particular business and will vary from what I have set up as an illustration according to the size and character of the business and the relative importance of the various activities.

The Taylor classification is valuable in a company operating a number of plants when it is desirable that each show its own set-up of expenses, costs and profits or losses, while at the same time a comparison of similar expenses and costs with those of other plants is made possible. Furthermore it permits consolidation without rearrangement for purposes of the business as a whole.

I shall not in this article attempt to illustrate completely the further working out of symbols for the various departments, or for other sections of a classification, as these are available in previously published papers.[4]

I earnestly hope that I may make clear the fact that a classification is essential to an orderly arrangement of the facts relating to a business and to the orderly conduct of its activities. It is especially helpful to a proper visualization and understanding of the business and its problems. The purposes and advantages of a classification may be summed up as follows:

1. *Organization.* It defines the plan of organization, the function, the scope and limitations of the activities of each department and subdivision thereof with their inter-relations and responsibilities.

2. *Accounting.* It provides for all the requirements of, and greatly facilitates, accounting and the setting up of reports and statements in the most effective manner for the management. This includes:

a. Analysis of indirect expenses coupled with budgetary control, or what may more properly be termed expense standards.

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[4] Thompson, C. B., "Classification and Symbolization," in *Scientific Management,* edited by C. B. Thompson, Harvard University Press, Cambridge, 1914.

Williams, John H., "On the Index as a Factor in Industry," *Bulletin of the Taylor Society,* Vol. II, No. 2, July, 1916.

Hathaway, King, "The Mnemonic System of Classification," *Industrial Management,* Vol. LX, No. 3, September, 1920.

Swan, John J., "Classification and Symbols," in *Management's Handbook,* edited by L. P. Alford, The Ronald Press Company, New York, 1924.

Cooke, Morris Llewellyn, "Classification and Symbolization," in *Scientific Management in American Industry,* edited by H. S. Person, Harper & Brothers, New York, 1929.

b. Cost accounting for manufactured products, including distribution of indirect expenses thereto.

c. Inventory control, through the automatic provision each month of figures showing increases or decreases in, and balances of, purchased-material stores, work in process, manufactured-product stores. This control extends not only to the major accounting divisions but, when desirable and useful, to the principal groups of each. Further supporting detail, even down to individual items, enables the management to put its finger upon the specific things responsible for proposed changes.

d. Analysis of sales by classes of products, by subclasses and individual items, in such detail as is desirable. This indicates as a regular practice the profitability of each, and the increases or decreases in their sales. By setting up a special classification for the purpose these same figures may be rearranged to provide an analysis of sales by classes of customers and territories. This gives a comparison of sales performance with standards or quotas.

e. Inventory of plant and equipment showing the nature of various capital expenditures, and providing for comparison with appropriations.

3. *Storeskeeping and stores accounting.* This facilitates, through logical store-room arrangement, the work of receiving, putting away and issuing materials, avoids misunderstandings and errors due to imperfect descriptions or variations in nomenclature, simplifies and expedites the work of keeping the balance-of-stores or stock ledgers, which serve not only as supporting detail for this feature of the accounting system but as the material element in the system of planning and control of productive work.

4. *Planning and control of production.* This covers the routing and order-of-work functions. The latter is sometimes referred to as scheduling and despatching. It provides a concise, invariable and easily understood designation for the various classes, kinds and sizes of products, and for the materials entering into them, indicates the relation and location of component parts in constructed products and of operations to be performed thereon. It facilitates the writing and issue of orders for work to be done, instructions pertaining thereto and the reporting and recording of progress of manufacture. It provides for the designation of the machines in which operations are to be performed and the tools to be used.

5. *Maintenance.* This provides for inspection, adjustment, the making of preventive as well as major repairs and even the sweeping of the shop or the cleaning of windows. Its advantages parallel those mentioned under the preceding heading.

6. *Storage and issue of tools and appliances.* This serves much the same purposes and affords similar advantages to those enumerated under the heading, Storeskeeping and Stores Accounting. It facilitates the designation of tools and appliances to be used as specified by instruction cards and defines the standard method to be followed in the performance of shop operations. It also is of service in connection with the maintenance of tool standards.

7. *Tabulation and filing of data.* This affords a logical and convenient system for sorting, collating and filing all data, reports and records used in the operation of the business and makes them quickly and easily available without recourse to cross indexing. This would include:

a. Cost and accounting records.

b. Drawings, specifications, or their equivalent.

c. Production or manufacturing orders.

d. Route charts and route sheets covering the work planned in the manufacture of a product and used to control and record progress thereon.

e. Data relating to machinery, tools and other physical equipment essential to its use and up-keep. This would include inventories, machine-capacity sheets, maintenance records and standard-practice instructions relating thereto.

f. Elementary time-study data used in planning manufacturing operations, preparing detailed instruction cards defining standard methods and setting the time in which such operations should be performed.

g. Standing orders defining the duties and functions of departments, subdivisions and individuals of the organization and describing the procedure to be followed in connection with various transactions.

This article will serve as a background for the next article in this series which will continue the discussion of organization with particular reference to the functions of the major executives.

Notes

Advanced Courses for Disengaged Engineers

Under the sponsorship of the Engineering Societies and the Engineering Colleges of the New York-New Jersey Metropolitan District a series of courses is being offered to disengaged engineers in the lecture rooms of the Engineering Building, 29 West 39th Street, New York. The courses are scheduled to open on January 9 with about four hundred advance registrations. They will be presented under six main headings—power-plant engineering, business finance, buildings and mechanical equipment of buildings, industrial applications of electricity, sales engineering, and industrial management.

In the industrial management group, courses are being given by Taylor Society members as follows: By Henry H. Farquhar, "Production and Materials Control"; by Francis Goodell, "Labor Management"; by Francis J. Carr, "Financial Control"; by John H. Williams, "Budgetary Control."

Those interested should address Mr. P. H. Littlefield in care of Mr. Alfred D. Flinn, Director of the Engineering Foundation, 29 West 39th Street, New York.

National Vocational Guidance Association Meeting

The meeting of the National Vocational Guidance Association from February 23-25, at the Nicolett Hotel, Minneapolis, which will immediately precede the meeting of the National Education Association in the same city, is of special significance this year. The Association is cognizant of the importance of education, especially for adults, in these changing times. It has taken for its general theme "Vocational Guidance in a Planned Society," recognizing that, whatever the social changes ahead, some degree of planning is unavoidable. The group is also giving special attention to the need for retraining those unemployed who have lost their employment through the advance of technology.

The officers and members of the Association are eager for the attendance at this meeting of industrial and commercial leaders as well as school men, so that they may have their practical help in discussing the challenge that is being presented them. It is hoped that Taylor Society members and friends in this part of the country will not miss the opportunity to participate in these meetings.

The meetings will open with an address on "The Organization of Economic Life in America." This will be followed by a specific consideration of the ways in which the distribution of workers in occupations is being affected by present conditions. Clues to trends will be examined and the possible responsibility of the Association in this field considered.

At a joint meeting with the personnel organizations on Friday forenoon the work of the Minneapolis Employment Stabilization Institute will be presented by members of its staff. A "panel" discussion of the Institute staff and members of other organizations will follow. This program is being arranged by the Personnel Research Federation and will demonstrate ways in which community services with highly scientific techniques can be co-ordinated and directed in solving the immediate practical problems of individuals.

All discussions will be in small groups with trained leaders. Each group will be asked to prepare a report covering its ideas as to forward steps which should be taken by the Association. At the Saturday morning meeting an attempt will be made to bring these reports together and weld them into a constructive program.

Reviews

The New Challenge of Distribution. By Harry Tipper, Harper & Brothers, New York and London, 1932, pages xvii, 216.

In "The New Challenge of Distribution" Mr. Tipper has given further evidence of the growing inclination of business men of wide experience to develop long-run objectives and to analyze business problems in the light of these objectives. To Mr. Tipper, the central problem of distribution is to be found in the fact that "ability to acquire the products of industry has not kept pace with the capacity to produce." Thus he classes himself with other students of the problem who have approached it from various angles. But the author's contact with the marketing aspects of business has enabled him to carry his analysis farther than it has been carried by those whose interest has been particularly in currency and wage problems. Pursuing his reasoning, he states that the fundamentals of the problems of distribution or marketing are area, intensity and cost. Large-scale production, creating the necessity for wider areas of distribution, increases the number and complexity of those problems in distribution which are beyond the control of the producer. The intensity of effort necessary to bring the product into actual use, generally admitted to have increased, affects materially the costs of distribution, by introducing the time factor required for reaching consumers and the need for increased investment. Many are willing to go with Mr. Tipper to this extent; few, however, will join him in the conclusion that "there is only one conceivable explanation" for the rise in prices beginning in the last decade of the nineteenth century. "All the increasing efficiencies and economies of production could no longer absorb and offset rising distribution costs" (p. 30). The assertion is not supported in the volume and ignores the influence of monetary factors, such as the supply of gold and changes in the use of credit.

The author recognizes that even though the animating objective of business may be that of satisfying consumer wants, quantitative adjustment becomes difficult in a regime of private property. Competition at various levels tends to introduce conflicts which Mr. Tipper sums up in two expressions—"producer versus producer" and "producer versus consumer." Competition within the same industry is declared to be healthful. Competition among different industries is subjected to an analysis in which the distinction is made between industries which depend upon special privilege of one sort or another, to which he gives the name "non-basic" industries, and "basic" industries, which require no aid from tariffs, franchises and the like. At this point Mr. Tipper arrives at the conclusion that the root of our economic evil lies in the rapid development of non-basic industries fostered by national aspiration (p. 84). Many economists and students of international affairs will agree in part with his conclusion, though by different processes of reasoning. In discussing the conflict of the producer versus the consumer he finds the cause of the business cycle to lie in the inflation of values caused by human greed and selfishness. The remedy he perceives in "the creation of mutuality between the supplier and consumer" (p. 104).

"The New Challenge to Distribution" is a thought-provoking book, though not a convincing one. It suffers, as all of our diagnoses of present difficulties have suffered, from the fact that it deals in generalities at a time when we are vitally concerned with a situation which requires concrete and practical action. One might agree with Mr. Tipper that greed and ignorance are responsible for the difficulties in which the world finds itself and for the problem of distribution, but at the same time he might be skeptical about the chance that greed and ignorance will pass out of the world in the foreseeable future. One may call, as Mr. Tipper does, for co-operation and planning in order to adjust the business structure and its functioning to the basic objective of satisfying consumer wants; such call in general terms gives emphasis but not enlightenment.

HARRY R. TOSDAL[1]

Preisvorbereitung (Pricing). Von Ed. Michel (member of the Taylor Society), Alltreu G. M. B. H., Verlags-Abteilung, Berlin-Wilmersdorf 1, 1932, pages vi, 115.

It seems to be a growing practice in Germany for authors to write short books, especially on technical subjects. At any rate, among the hundred-odd German books and pamphlets which the reviewer brought back with him after three months spent in Europe last summer, hardly one is of considerable length. Perhaps this practice is due to the need for cutting down the cost of publication; in all events, it results in clear and succinct exposition of the chosen subjects, and is a boon to the busy reader.

Michel's book, "Pricing," is an admirable example of brevity. In 115 pages, the author presents a concise and well-balanced picture of the fundamentals and techniques of his subject. He has arranged his material so well in the five parts into which the book is divided that he has found space for the insertion of fifty illustrations of faultless character which serve to clarify his reasoning.

As though he feared that the reader might nevertheless fail to comprehend his thesis, Michel has included in the last part of his book a critical review of its contents which ought to be of material aid to the reader who is not sufficiently qualified along technical lines readily to grasp what is spread upon the pages of the book.

Michel not alone is a successful consulting engineer with wide experience in several European countries, but he has a flair for philosophy. And so, the first part of his book is devoted to a discussion of fundamentals; his point of departure is a reference to the beginnings of human society. Michel traces the process of determining values involved in the cycle of labor and consumption, and indicates the necessity that faced mankind of creating at least as much wealth as it consumed. He refers to the rhythm of the flow of values through their various transformations and points out that when society advanced to higher levels of development, and markets, as such, came into being, measures of value had to be devised for facilitating exchanges. It was then that the process of calculating prices as expressions of value was initiated.

As conditions became more complex, external influences upon the rhythm of values grew in importance and the increasing number of variables tended to cause greater and greater interruptions of the rhythm. Today it is impossible to conceive of undertaking processes of production without the use of definite measures of value as a basis for intelligent pricing.

So much for Michel's general approach. In the second part of his book he discusses analytically the composition of costs, segregating the various elements according to the factors of quantity and time. He dwells upon the need for differentiating between the concepts of cost and price, and stresses the tremendous (*riesengross*) problem caused by the influence of fixed costs in times when the volume of production decreases. He then goes into a description of the records, accounts and methods of distribution which he has developed for pricing purposes and discusses some very technical features involved.

In the third part of his book, Michel presents his views respecting what might be termed the synthesis of pricing. This part is so "meaty" and much of the material is so new, that only a reading of it can convey a full appreciation of the fundamental points made. It is interesting to note, however, that when discussion of total costs and their control is reached, the author advocates the Gantt technique and visualizes also the "breakeven" or "cross-over" charts with which American students of business economics are so familiar.

In the fourth part of his book, Michel discusses what he terms "die dynamische Disposition" (literally, the dynamic measure). By this expression he means to convey the thought that in modern business there is a daily or an hourly need for the analysis and determination of changing elements in the pricing process. Materials, work performance and the problems of organization involved in adhering to the time factor of accomplishment, all have an important bearing upon the pricing process; the numerous illustrations prepared by the author serve to indicate the techniques upon which he lays stress.

A questionnaire containing thirty reading questions which in the author's judgment constitute a basis for appraising the efficiency of existing accounting and pricing methods, is included as a part of the last section of Michel's book. It is an interesting example of the technique employed by a German consulting engineer in judging the effectiveness of an organization he is called upon to serve.

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[1] Professor of Marketing, Harvard Graduate School of Business Administration, Boston, Mass.

"Pricing" is a book which can hardly be described as easy reading, even presupposing complete familiarity with the German language. The author's style is clear and crisp, and he has taken great pains to make his subject comprehensive. But his material is technical throughout and, as modern German has in recent years had to absorb an immense number of new terms created largely by the huge changes which have taken place in industrial practices, this reviewer found it quite a chore to prepare the discussion which is here presented. However, the fact that the author and the reviewer coincidentally spent six years as students in one and the same Ober-Realschule in Kassel, Germany, more than a generation ago, induced a special interest in undertaking the desired review.

Michel has made a sound contribution to the literature on "Pricing" and it is really a pity that so few American students will be able to straddle the language barrier and so derive the full benefit of his work.

Harry Arthur Hopf[2]

How to Stop Deflation. By Professor J. Goudriaan, (member of the Taylor Society), The Search Publishing Company Limited, London, 1932, pages 32. (6d)

This pamphlet by one of our members outlines a method for stabilizing gold value in terms of goods, by means of open-market operations of circulation banks in the commodity markets, in accordance with the formula: 1 kg. of gold=the sum of the fixed quantities of raw materials.

This brief critique of our present monetary system, like so many plans offered as solutions for admitted evils, is in itself open to many criticisms.

How Workers Find Jobs. By Dorothea De Schweinitz, University of Pennsylvania Press, Philadelphia, 1932, pages 199.

There are certain everyday events of life which never are without their element of mystery, such as how people discover their life-mates, how they decide on their vocations and how they actually find their jobs. Miss De Schweinitz has selected the last two of these for detailed study. The setting is Philadelphia, the time the now relatively prosperous year of 1930, the trade the full-fashioned hosiery industry, the participants are some 4,000 workers in eleven union and seven non-union mills, and the method is a somewhat inquisitive questionnaire, with its inevitable by-products of human interest. The book is factual, analytical, statistical, yet it is written with insight and with a certain charm. Miss De Schweinitz states that the job of the full-fashioned hosiery worker "is fraught with interest and excitement," and she makes us feel it. The high wage of $50 or $60 a week that existed previously, the skill required, the clean, neat jobs, the dependence upon individual effort, and possibly too, the pleasure of contemplating the smart result, are among the factors which make us well believe why bright-eyed applicants at junior placement services sometimes state their vocational preferences as "aviation or hosiery."

The statistics gathered substitute facts for opinions. Aid from friends and relatives in 58 per cent of the cases, personal application at the mills in 22.5 per cent, sallies to employment agencies, and a variety of other means are the ways by which workers found jobs. When industry was good the process was merely fatiguing and inefficient; more recently, as the industry has had to readjust itself to severer competition and perhaps a permanently lowered demand, the search for jobs becomes a weary treadmill and a disheartening experience. But the study is more than a question of details of finding jobs. It is a broad treatise on the rise and development of a principal industry in the city in its prosperous decade 1919-1929; it explains the processes, the conditions of work, the present-day problems which the industry faces through competition for trade and internal division on matters of policy, the nature of the union in the trade and the characteristic of the workers engaged in the various occupations. The concentration on a thorough and detailed study of the practical possibilities of one industry in a single locality is the special contribution to the general problem of employment direction.

The methods by which workers found jobs, as was to be expected, were haphazard, unorganized, wasteful. Recommendations were inevitable concerning the need of a more systematic and efficient method, viz., the adoption of one or more employment exchanges. There is convincing evidence of the possible usefulness of an employment agency to a trade in such matters as studying the trends of the industry, controlling entrances and exits, aiding surplus workers, providing contacts with outside concerns, gathering accurate statistics, providing work tests in case of unemployment reserves, and many other services.

The study thus reveals the superiority of ordered vocational direction. The question remaining is how employers and employes and the public may be led to the point of establishing such an agency. Familiar difficulties are given consideration; the disagreement between the union and the non-union branches of the industry, the narrowly competitive attitude of at least a minority of employers, the unwillingness of the various parties concerned to grant the necessary authority to a joint or public agency. The situation reveals the old conflict between inertia and change; between the co-operative, planned economic processes which men conceive, and the chaotic, competitive methods which continue to exist.

Herman Feldman[3]

Men at Work. By Lewis W. Hine, The Macmillan Company, New York, 1932, pages 46.

Over fifty of Lewis W. Hine's photographic studies of men at work have been put in permanent and delightful form. I suppose that there are thousands who have been arrested by one or another of these satisfying works of art—and other thousands who know his name, fame, and the story of his insidious camera warfare during the early child-labor campaign.

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[2] Management Engineer, New York.

[3] Professor of Industrial Relations, Amos Tuck School of Administration and Finance, Dartmouth College, Hanover, N. H.

Through the eye, and I know not what native rhythms of aesthetics, which we somehow inherit through Philistine generations, the Hine studies radiate truths of industry that no thinker has ever succeeded in chiselling into words.

Whatever power there is in this finished piece of planning and printing, there is, however, no trace of sentimentality and sugar. Here are found merely the pictures with the briefest of explanations; and not a word of propaganda. One draws his own conclusions unassisted. We have, therefore, a new sort of effort in the field where, as Hine puts it, "The character of the men is being put into the motors, the airplanes, the dynamos upon which the life and happiness of millions of us depend."

Were there any G. H. Q. in the far-flung war on prejudice, Hine's *Men at work* would go into every soldier's knapsack, and would also be found upon every library table where there are adolescent children.

FRANCIS GOODELL[4]

Sociologus, A Journal of Sociology and Social Psychology, (Zeitschrift für Völkerpsychologie und Soziologie), Third Issue, September, 1932. Edited by R. Thurnwald, C. L. Hirschfeld, Leipzig and G. E. Stechert & Co., New York.

The chief task this journal has set itself is the analysis and determination of present-day social forces.

Articles and reviews are in German and English. Prof. L. L. Bernard (Washington University) has written an historical systematic survey of American social psychology and its present position. Prof. A. J. Todd (Northwestern University) reports on measures to combat unemployment in the United States. Prof. Robert Redfield writes about Maya Archaeology as the Maya see it.

Besides these English essays are two German ones. Dr. Otto Neurath (Vienna) writes about Social Behaviorism; Prof. Richard Müller-Freienfels (Pedagogical Academy, Stettin) writes on the Sociology of Truth. Special attention is drawn to the review section dealing with recent publications in the whole field of sociology and allied subjects. No other periodical devotes so much space to such reviews. Special attention is paid to the quality and the system of classification of these reviews.

Books Received

**The Abolition of Unemployment.* By Frank D. Graham, Princeton University Press, Princeton, 1932, pages ix, 98. ($2.00)

Clerical Salaries in the Life Insurance Business. By the Life Office Management Association, Fort Wayne, 1932, pages xiv, 219.

**Common Sense Applied to Motion and Time Study.* By Allan H. Mogensen, The McGraw-Hill Book Company, Inc., New York and London, 1932, pages 228. ($2.50)

**The Consumer—His Nature and His Changing Habits.* By Walter B. Pitkin, McGraw-Hill Book Company, Inc., New York and London, 1932, pages xiii, 421. ($4.00)

**The Development of American Industries.* By John George Glover and William Bouck Cornell, Prentice-Hall, Inc., New York, 1932, pages xxiii, 932. ($5.00)

**Economic Tendencies in the United States.* By Frederick C. Mills, The National Bureau of Economic Research, New York, 1932, pages 639, tables 213, charts 108. ($5.00)

Further Contributions to the Prestige Value of Public Employment. By Leonard D. White, The University of Chicago Press, Chicago, 1932, pages xvii, 88. ($1.50)

**Industrial Psychology.* By Morris S. Viteles, W. W. Norton & Company, Inc., New York, 1932, pages xviii, 652. ($5.50)

The Lake Cargo Coal Rate Controversy. A Study in Governmental Adjustment of a Sectional Dispute. By Harvey C. Mansfield, Columbia University Press, New York, and P. S. King & Son, Ltd., London, 1932, pages 273. ($4.25)

**Managing Minds.* By Charles R. Allen and Harry A. Tiemann, The Century Co., New York and London, 1932, pages xiii, 286. ($3.00)

Muscular Work—Fatigue and Recovery. By G. P. Crowden, Isaac Pitman & Sons, London and New York, 1932, pages ix, 74. ($1.00)

**The Philadelphia Upholstery Weaving Industry.* A Case Study of a Declining Industry in an Old Manufacturing Center. By C. Canby Balderston, Robert P. Brecht, Miriam Hussey, Gladys Palmer, Edward N. Wright, Research Studies XX, Industrial Research Department, Wharton School of Finance and Commerce, University of Pennsylvania Press, Philadelphia, 1932, pages 231. ($2.50)

Proceedings of the Thirteenth International Cost Conference. By the National Association of Cost Accountants, New York, 1932, pages iii, 320. ($3.00)

Proceedings of the 1932 Annual Conference of the Life Office Management Association. Life Office Management Association, Fort Wayne, 1932, pages 327. ($5.00)

**Prospecting for Heaven.* Some Conversations About Science and The Good Life. By Edwin R. Embree, The Viking Press, New York, 1932, pages 185. ($1.75)

**Union Tactics and Economic Change.* A Case Study of Three Philadelphia Textile Unions. By Gladys L. Palmer, Industrial Research Department, Wharton School of Finance and Commerce, University of Pennsylvania Press, Philadelphia, 1932, pages 228. ($2.00)

**Wage Rates and Working Time in the Bituminous Coal Industry, 1912-1922.* By Waldo E. Fisher and Anne Bezanson, Research Studies XXI, Industrial Research Department, Wharton School of Finance and Commerce, University of Pennsylvania Press, 1932, pages xxii, 374. ($3.50)

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[4] Management Counselor, New York, N. Y.

*To be reviewed later.

Objects of the Taylor Society Incorporated

The objects of this Society are, through research, discussion, publication and other appropriate means:

1. To secure—for the common benefit of the community, the worker, the manager and the employer—understanding and intelligent direction of the principles of administration and management which govern organized effort for accomplishing industrial and other social purposes.

2. To secure the gradual elimination of unnecessary effort and of unduly burdensome toil in the accomplishment of the work of the world.

3. To promote the scientific study and teaching of the principles governing organized effort, and of the mechanisms of their adaptations and application under varying and changing conditions.

4. To promote general recognition of the fact that the evaluation and application of these principles and mechanisms are the mutual concern of the community, the worker, the manager and the employer.

5. To inspire in labor, manager and employer a constant adherence to the highest ethical conception of their individual and collective responsibility.

Membership

Membership in the Taylor Society may be either individual or firm. The following is a statement of membership classes. The fees and dues for members in other countries than the United States are one-half of those specified. The exception is the organized branch which is permitted to remit one-quarter of the regular fees for each of its individual or firm members. Application for membership should be made on a regular form which may be secured from the Society. New members may be elected directly to the grades marked.*

1. **Member*: An individual interested in the development of the science and the art of management as engineer, executive, operative, scientist, investigator or teacher. Minimum age 28. Initiation Fee, $15. Annual dues including subscription to the Bulletin, $20.

2. **Junior Member*: A younger member. A Junior Member may become a Member without payment of additional initiation fee at 28 years of age and must change to Member at 30 years. Initiation Fee, $5. Annual dues including subscription to the Bulletin, $10.

   For any of the above grades a person engaged in educational work, state service, government service or the service of any other non-commercial enterprise of an eleemosynary nature shall pay one-half the initiation fee and one-half the annual dues of the grade to which elected.

3. *Honorary Member*: A member elected by the Board of Directors for exceptionally distinguished service in the advancement of the science and the art of management.

4. **Life Member*: Any Member who has prepaid all dues by the payment of $500.

5. **Firm Member*: A firm or organization interested in the advancement of the science and the art of management which desires to make the service of the Society available to members of its organization. A firm member designates two representatives (who may be changed from time to time at the organization's discretion) who have all the rights and privileges of membership except the right to vote and to hold office. Annual dues, including two subscriptions to the Bulletin, $40.

6. **Contributing Member*: Any individual, firm or organization desiring to promote the work of the Society by an annual contribution of $100 or more. A contributing member has all the privileges of personal or firm membership, as the case may be, including one subscription to the Bulletin for each $20 contributed.

7. **Student Associate*: A regularly enrolled student of management in any school of engineering, business administration, commerce or arts, of collegiate rank, or a graduate of such institution who has applied for membership not later than one year after graduation, elected upon recommendation of the instructor in charge of management courses. A Student Associate may become a Junior Member, without payment of initiation fee, any time after graduation and must become a Junior Member at the age of 25. Annual dues including subscription to the Bulletin, $3.

All dues are payable in advance, either annually or in semi-annual instalments. The fiscal year is November 1 to October 31. Members elected other than at the beginning of the fiscal year are charged pro rata (quarterly) for the first year.

B.B.

Economic Planning a Central Problem

TO DEAL with the central problem of balance, or with any of its ramifications, economic planning is called for. At present, however, that phrase represents a social need rather than a social capacity. . . To gloss over the difficulties of the task is no service to mankind; to face them honestly should not discourage those who have faith in men's capacity to find their way out of difficulties by taking thought. As the task of planning economic relations is faced in detail, it is not unlikely that modest schemes will be devised which will make the present organization work more steadily. It is more in line with past experience to anticipate a long series of cumulative improvements which will gradually transform existing economic organization into something different, than to anticipate a sudden revolution in our institutions.

* * *

Promptly upon entering the World War, the United States followed the example of its allies and opponents by seeking to mobilize economic resources behind its military program. . .

Despite the wastes and confusion attending upon this sudden overturn in economic organization, the mobilization served its purpose. In retrospect it offers a significant illustration of the rapidity and the success with which a people can recast its basic institutions at need. Seemingly, what engineers regard as the slow pace of change in economic organization is due more to absence of unity in will and purpose than to lack of capacity to imagine and carry out alterations. In 1917 the country was nearly unanimous in putting victory in the war above all other aims. In this supreme aim it had a criterion sufficiently definite to determine what should be done. No similar revolution could be effected in times of peace, unless a similar agreement in purpose, supplying an equally definite criterion of social values, could be attained. But is it beyond the range of men's capacity some day to take the enhancement of social welfare as seriously as our generation took the winning of a war?

From the Report of the President's
Committee on *Recent Social Trends*

AUG 5 1933